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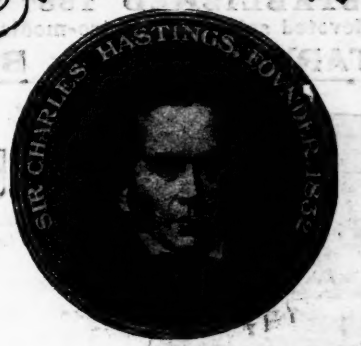

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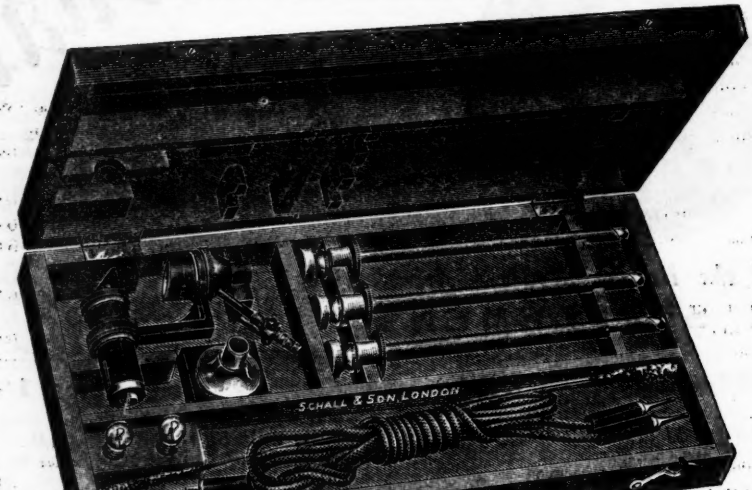

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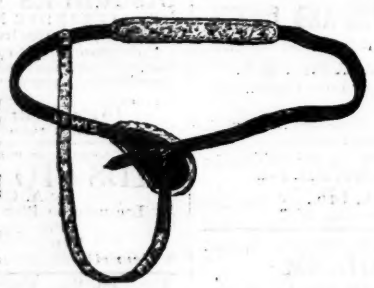

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ACUTE ENCEPHALO-MYELITIS.

A CLINICAL AND EXPERIMENTAL INVESTIGATION OF AN AUSTRALIAN EPIDEMIC.

BY

J. B. CLELAND, M.D., CH.M.,

PRINCIPAL MICROBIOLOGIST, DEPARTMENT OF PUBLIC HEALTH, N.S.W.,

AND

ALFRED W. CAMPBELL, M.D.

(From the Microbiological Laboratory, Department of Public Health, New South Wales.)

IN the late summer of the years 1917 and 1918 certain country towns in New South Wales (also in certain parts of Queensland and Victoria) were visited by an epidemic, so sudden in attack, so indiscriminate in its selection of children and adults, and so frequently fatal, that it received the newspaper name of "the mysterious disease."

The disease soon came under investigation, and earlier workers suggested that it represented the meningitic form of acute poliomyelitis (the Heine-Medin disease). This suggestion we ventured to consider premature, and proceeding to the further investigation which we thought was demanded, a series of features were revealed—clinical, histological, and experimental—which seem to us so distinctive as to render the case for acute poliomyelitis unproven, and to point at least to the operation of a mutant of the virus of acute poliomyelitis, and perhaps to a distinct though kindred disease, and in either case to justify the designation "X" (unknown quantity) or "acute encephalo-myelitis."* We may add that the disease appears to differ decidedly from "encephalitis lethargica," recently epidemic in England.

The research has been based on the clinical examination of 134 human cases, the examination of tissues from sixteen of these which proved fatal, and a long series of animal experiments, coupled with exhaustive histological examination of the tissues; being so extensive, we can in this paper merely attempt to set forth the salient findings, punctuating those which are distinctive and submitting our thesis for judgement.

EPIDEMIOLOGY.

One feature of the epidemic is that it appeared in the same months—namely, January, February, March, and April (chiefly February and March)—of two successive years. Another feature concerns distribution. In New South Wales almost all the cases arose in "outback" towns or districts, some hundreds of miles remote both from the metropolis (Sydney) and from one another, but all alike in possession of a dry climate. Hence it is permissible to suggest that climate may be a factor.

Further, it is specially to be observed that the epidemic did not synchronize and could not be connected with any epidemic of acute poliomyelitis arising either in metropolitan or rural districts. Similarly, cases of cerebro-spinal meningitis were comparatively few in New South Wales during the time and the years in question, and the same applies to influenza.

Concerning the dissemination of the disease in given localities, we obtained some evidence that it spread from member to member in families, or that it arose in "contacts"; in the majority of cases, however, the source of infection was hidden. Also, neither by observation, inquiry, nor experiment could we bring blame upon insects or other non-human carriers.

Age and Sex Incidence.

Infants and children under 5 years of age (nearly 50 per cent. of the total) were exceedingly prone to the affection; at the same time there were 34 cases in persons over 25 years of age.

Males suffered more than females, the figures being 85 to 36.

Termination.

Ninety-four patients died, 35 recovered completely, and 5 recovered, but with subsequent paralysis (3 cases), or signs of mental disorder (2 cases). This death-rate (70 per cent.) is not only high in itself, but high in comparison with that shown in epidemics of "acute poliomyelitis."

Duration.

In the fatal cases the duration of the illness was on a general average four to six days. In a few fulminant cases, affecting both adults and children, death took place within twenty-four hours. The fatal case of longest duration lasted twelve days. In those who recovered, acute symptoms usually passed off within from ten to twelve days, and convalescence was rapid.

SYMPTOMS.

Though there was probably an incubation period of from five to twelve days (compare the experiments on monkeys), we have not sufficient data to fix its length.

Indefinite symptoms such as headache, lassitude, malaise, irritability, mental confusion, drowsiness, pains in various parts of the body, and weakness of the limbs, were often present for from two to five days, and might be regarded as prodromal indications, but these were as often absent and then the onset of acute and definite symptoms occurred with dramatic suddenness.

An attack of vomiting, significant of cerebral irritation, was the most frequent initial sign, particularly in children, and was soon followed by fever and convulsions. In adults the opening symptoms took the form of headache, mental disorder (confusion, drowsiness, lethargy), retrocervical pain, and general muscular weakness and inco-ordination. In all cases there was elevation of temperature; in the early stages readings of 101° or 102° F. were usual, and readings of 104° to 105° as the disease progressed were common. Convulsions, or convulsive movements of some kind, occurred in no less than 87 cases, and adults did not escape, although they suffered less frequently than children. In the beginning the convulsions were of the ordinary kind. Later, with dulling of consciousness, the ordinary convulsion was replaced by erratic, perhaps alternating, movements of the arms or legs—in some instances the patient was aptly described as "thrashing the bed"—or a limb was held flexed in tonic spasm, or there were localized twitchings of individual limb muscles, coarse tremors of the limbs, facial twitching, grinding of the teeth, alternate protrusion and retraction of the tongue, blinking of the eyes, or hiccough. In short, there was no end to the convulsive muscular movements. There was likewise a state of heightened reflex activity, slight disturbance, as in examining or sponging the patient, sufficing to induce a convulsive movement. Rigidity also, often unevenly distributed, was a dominant sign.

Mental symptoms of some kind were present in a considerable number of cases. We have mentioned lethargy, confusion, and drowsiness as early symptoms, and may add that these were followed with extraordinary frequency by varying degrees of unconsciousness; indeed, this happened in no fewer than 83 cases. Often the initial mental obfuscation was followed by delirium and then by unconsciousness, gradually deepening into coma. In two adults there were symptoms of acute delirious mania, and many were "dazed," "irrational," "childish," or "incoherent."

Affection of the cranial nerves, apart from those which subserve visceral functions, was not a feature. In one case alone unilateral facial paresis was noted. Definite facial or lingual paralysis, or fifth nerve paralysis, or ophthalmoplegia were not once observed. This absence of cranial nerve paralysis constitutes an important difference from encephalitis lethargica. Strabismus, though frequently seen, was a late phenomenon and always of the irritative, irregular kind seen in cases of meningitis. Nystagmus was not much in evidence. Concerning cranial nerves subserving visceral functions, swallowing was frequently interfered with, Cheyne-Stokes breathing was occasionally noticed, and respiratory or vagal paralysis was often the assigned immediate cause of death.

Limbs.—In comparison with epidemics of ordinary "acute poliomyelitis" the number of cases in which paralysis of limb or body muscles occurred was extremely small. Thus, among the 40 who survived, there were but 3 left with lasting paralysis (lower limb paralysis in each instance), while among the 93 fatal cases there were only 8 in which paralysis of some kind, not always definite, was noted.

* The investigation is about to be published *in extenso* in the report of the Microbiological Laboratory of the Department of Public Health, Sydney.

Of other less important or occasional symptoms, we have to mention alimentary disorder, nasal discharge (muco-purulent or sanious), incontinence of urine and faeces, priapism, and albuminuria.

The cerebro-spinal fluid, examined in a great many cases, usually showed an excess of cell contents, but no specifically abnormal elements; the usual examinations, cultural and microscopic, for pathogenic micro-organisms proved negative. Hence the conclusion seems justified that the responsible organism is a filter passer.

In blood counts made by Dr. Burnell in a certain number of cases, an increase of leucocytes was the only constant change.

A Clinical Report of a Case.

(*Notes of Drs. Burnell and Wallace.*)

K. T., male, aged 6 years, was admitted to the Broken Hill Hospital on February 15th and died on February 18th. The child had been "out of sorts" for a week. On February 13th he complained of headache and at night was restless and suffered from retching. Next day he was drowsy and without appetite. At night he became delirious and his limbs twitched. At midday on February 15th twitching of the limbs became worse, and half an hour later he suddenly lost consciousness, lying with his eyes closed, fingers twitching and limbs moving aimlessly. In this state he was brought to hospital.

When examined after admission the child was semi-conscious and resented interference. The right arm was moved about aimlessly, and the same arm and the right leg were rather rigid. There was cervical rigidity but no head retraction. The abdomen was retracted. Kernig's sign was present on both sides. The knee-jerks were absent; the plantar reflexes were flexor. The pupils were equal and contracted. There was no nystagmus. He lay with open, staring eyes, looking dazed, and he frothed at the mouth. The heart and lung sounds were normal. Later he became rational, giving his name and indicating the site of the headache, which was frontal, and saying there was no pain elsewhere. He swallowed well. His pulse was weak at times. He passed urine in his bed. A blood count showed 28,000 leucocytes per c.mm., of which 90 per cent. were polymorphonuclears, 1 per cent. small lymphocytes, and 9 per cent. transitional cells. Lumbar puncture was performed and a few lymphocytes were present in the fluid, but no organisms.

On February 16th and 17th there were alternating periods of consciousness and unconsciousness. The temperature was sustained between 102° and 105° F., the pulse varied from 120 to 140, and the respirations from 32 to 48.

He died on February 18th, and at the *post-mortem* examination injection of the pia mater of the brain, and a little blood-stained fluid in the left pleural cavity were noted.

Microscopic Examination (Human Cases).

Material from 16 fatal cases was submitted to exhaustive examination, and in case after case the nervous system was found to be affected by similar changes, the only difference being one of degree. Other tissues—heart, lung, liver, kidney, lymphatic glands, etc.—showed no distinctive change.

The changes in the nervous system were acute, and followed the blood vessels. Vascular engorgement was general, and was accompanied by a tendency to capillary haemorrhage, specially noticeable in the pia mater of all parts, and in certain parts of the grey substance. In many instances the congestion was so great that the entire vessel plexus stood out as if artificially injected, presenting a very striking picture when seen in the brain cortex or spinal cornua.

Another constant and characteristic feature, and one which we regarded as primary, was an investment of the veins, small and large, by a collar, sheath, or sleeve of lymphocyte-like cells, generally several layers deep and filling the perivenous space. Arteries appeared at times to show a similar investing cell accumulation, but the appearances were invariably traceable to exudation from the venae comites of such arteries.

In addition to these sheaths of lymphocyte-like cells round the veins, collections, colonies, or islets of similar cells were found lying apparently free and isolated in the nervous substance. They were specially noticed in the basal nuclei, the nucleus pontis, the olivary bodies of the medulla, and the spinal grey substance, and probably represented exudations or infiltrations from capillaries.

Another important change found in the cortex cerebri and pons, in some cases, we regard as foci of miliary necrosis or softening. These occurred in the form of oval or round areas which stood out by their pallor and consisted of a delicate reticulum from which all nervous elements had disappeared. We believe these to have resulted from the occlusion of terminal vessels.

Degeneration or destruction of nerve cells was not a prominent feature. Cells of course were seen showing stages of chromatolysis, or beset by so-called cytophages, but on the whole the integrity of the nerve cells was remarkable; indeed, cells situated in the anterior cornua of the spinal cord were often seen in a fair state of preservation although lying in fields flooded with lymphocytes.

Certain parts of the nervous system showed the changes more intensely than others. Such parts were the cortex cerebri, the basal nuclei, the dentate nucleus of the cerebellum, the dorsal region of the pons and medulla, and the cornua of the spinal cord. Obviously these are all composed of grey matter, but from this it must not be inferred that the changes were confined to the grey substance; white substance suffered, but to a very much less extent than grey, and the difference appeared to us to be solely due to the difference in vascular supply of the respective substances.

Commentary.

It may be gathered from the above description that the changes of disease fall into line with those described as characterizing "acute poliomyelitis." There are, however, important differences. Thus, while the changes in all our cases were widely distributed and collectively severe, in one instance alone were the lesions in any situation, but particularly in the spinal cord, gross in character, that is, represented by obvious areas of destructive necrosis or softening, lesions sufficiently great to enable a pathologist to couple paralysis with them as a certain clinical forerunner. (The same applies to our animal series.) Again, in practically all our cases the changes in the encephalon were dominant, greater and never less than those in the spinal cord, which agrees with the clinical manifestations, but not, so far as we know, with what has been shown in any recorded epidemic of "acute poliomyelitis."

Experiments on Animals.

Our experimental investigation extended over many months, and is represented by a total of over 130 experiments. Various animals were used—namely, macaque monkeys, sheep, one horse, three calves, and some lower animals. Numerous side-issues also were followed up. Hence the investigation has been comprehensive as well as extensive. It will be understood that in work of this kind negative and positive results become intermingled, and both call for explanation. Hence it is necessary to set down the failures in as much detail as the successes, but since we have done this in our full report, already quoted, there is no call for repetition here.

Positive Results.

We may begin by saying that all our positive results have followed the intracerebral injection of virus-containing material, which material consisted of an emulsion in glycerin or normal saline solution of portions of the nervous system (brain, spinal cord, pons, and medulla) of the human subject or animal dead from "X disease."

I. We have been successful in conveying "X disease" from the human subject (3 cases) to 5 monkeys (*Macacus rhesus*).

II. We have been successful in conveying the disease from monkey to monkey, and in showing that the virus may breed true and maintain its virulence through a succession of fourteen generations. We have also found that, in the case of *Macacus rhesus*, intracerebral inoculation of the material described gave a "take" with consistent certainty, showing that this species of monkey seems to possess little immunity to the disease, and at the same time enabling the experimenter to keep the virus living for an indefinite period.

III. We have succeeded in transmitting the disease (*a*) from monkey to sheep, (*b*) from sheep to sheep, and (*c*) back from sheep to monkey, and from one of these monkeys through a series of further monkeys. The sheep, however, appears to differ from the monkey in possessing some natural immunity; thus our experience was that of three inoculated sheep one might give a definite "take," while the remaining two might "take" either very slightly or not at all.

IV. We have succeeded in transmitting the disease with fatal results from the monkey to one horse and one calf.

We look upon the susceptibility of the sheep, horse, and calf as highly important, because, so far as we are aware, from the writings of Flexner and many others, acute poliomyelitis, while transmissible to the monkey, is not to the sheep, nor to horse, nor calf. The fact, therefore, provides another ground for believing that "X disease" and "acute poliomyelitis" are not identical, and at the same time encourages hope of the future obtainment of a serviceable antiserum.

Next, before mentioning the negative results, we shall give a short account of the symptoms and microscopic findings in the successfully inoculated animals.

A. *Monkey.*

The successfully inoculated animals, twenty altogether, recovered well from the operation and continued in their usual health for from five to twelve days. Then they became obviously ill, and the progress of serious symptoms was rapid, usually leading to a moribund state or a fatal termination in from two and a half to six days.

The initial symptoms were general dullness, and an anxious facial expression, suggestive of pain or some kind of suffering. On the following day the animal would be found sitting with half-closed eyes, as if dozing, and its coat would be staring. When induced to move, some muscular weakness and incoordination would be apparent. Some animals at this stage presented a rabid demeanour. Later, the muscular incoordination and weakness would be very decided, and there might be some general coarse tremor. (The possibility of some of the apparent inco-ordination being due to impairment of vision must be considered.) Definite flaccid paralysis of limbs was not a feature. At this stage, in the case of three animals, disturbance of any kind, even clapping the hands, evoked a convulsion, characterized by a fall, a period of apparent unconsciousness, tonic spasm, rolling of the eyes, but no decided clonic movement, all lasting about one or two minutes, and leaving the animal more dazed than before. The only cranial nerve paralysis observed was squint in two animals and ptosis in three. Terminally, with accumulated weakness, incoordination, convulsions, and stupor, the animal would be found prostrate in the cage and progressing towards a moribund state. And even at this state flaccid paralysis was not definitely established; there would still be some prehensile power in hands and feet, nocuous stimuli would evoke some movement (also denoting preservation of protopathic sensibility), the muscle tone would not be lost, the tendon reflexes could be elicited, there would be movements of the tail and head, and the animal might chew and swallow food placed in its mouth.

The condition differed, therefore, from that obtaining in experimentally produced "acute poliomyelitis," in which, according to other writers and in agreement with our own experiences, flaccid paralysis of one or more limbs, shown by absolute inability to move the limb or limbs and by muscular flaccidity, is a dominant sign.

Microscopic Examination.—Our examination of the nervous system and other tissues of the animals in this experimental series was as comprehensive as in the human series, and the following is obviously a summarized description of the changes found.

At the site of inoculation (when visible) there were ordinary reactionary changes, without suppuration. The pia mater, particularly of the brain and cerebellum, was congested and showed a tendency to haemorrhage and cell exudation in the pial meshes.

Generally distributed throughout the nervous system, specially affecting the grey but not sparing the white substance, vascular engorgement, sheathing of the veins with small round cells, colonies of small round cells, and splashes of petechial haemorrhage, were found, and again these changes were never grossly destructive, and must have collectively exercised their injurious effects. From the comparative standpoint they closely resembled those noted in the human subject, the only difference being that in the monkey the affection of brain, cerebellum, pons, and medulla was less in degree.

B. *Sheep.*

Thirteen sheep were successfully inoculated, as confirmed by histological examination.

In these the incubation period varied from three to twelve days, the actual illness from one to five or seven days. The first symptoms were disinclination to "feed" and hanging of the head. Then signs of cerebro-spinal irritation arose. Thus quivering or tremor of the lips or ears was frequent, sometimes extending to the whole body and appearing as epileptiform convulsions. Champing movements of the jaws, grinding of the teeth, and accelerated or irregular breathing were also common. While cervical rigidity, retraction of the head, a stiff gait, a tendency to walk in a circle, "staggers," drowsiness, weakness in the hind legs (one case), nasal discharge of mucus, or dribbling from the mouth, were occasionally noticed. All these animals died or were killed when moribund.

Microscopic Examination.—At the site of inoculation there were the usual reactionary changes, without suppuration. Filling of the perivenous spaces with small round deeply-stained cells was the dominant and outstanding change (more so than in man and the monkey). At the same time there were splashes of haemorrhage and an infiltration of the tissues with small round cells. These changes were again distributed throughout the nervous system, but were most intense in the basal nuclei and the grey substance of the medulla oblongata and spinal cord. There can be no question that the histological picture in the sheep was produced by the same virus as had operated in man and the monkey.

C. *Horse.*

One horse was inoculated successfully.

After an inoculation period of nine days the animal (a yearling colt) had two "turns," during which it walked in a circle towards the left. On the following day its head was depressed, it staggered on moving, it inclined to fall to the left side, and it had twitching of facial muscles, hurried abdominal respirations, a temperature of 103.8° F., and appeared to be blind. Next day it was "down" on its right side, unable to rise. There were tremors and irregular movements of the limbs, the nostrils were "working," and the ears and eyebrows twitching. In this state intense and repeated convulsions supervened, which had lasted for three-quarters of an hour when the animal was killed.

Microscopic Examination.—The changes present in the nervous system were closely comparable with those we had so frequently produced in the sheep and monkey.

D. *Calf.*

One calf was inoculated successfully.

There was an incubation period of five days, when the animal went off its food, hung its head, and trembled all over. On the second day it was worse. On the third day it was found lying on its right side with arched back and retracted neck. Thereafter general and severe convulsions arose and caused death.

Microscopic Examination.—The histological changes were remarkably like those seen in the horse and sheep.

NEGATIVE RESULTS.

A. *Monkeys.*

Eight monkeys died shortly after the operation, or from sepsis, and their cases may be dismissed from consideration.

In the case of 10 monkeys, intracerebral inoculations of brain and spinal cord emulsion from 8 human cases of "X disease" failed. These failures were attributed on the one hand to the absence, relative or complete, of the virus in the injection, due to the length of time, ten to twenty-eight days, that the glycerinated material had been kept, or to injurious conditions suffered by the material during transit by post; or, on the other hand, to the species of monkey employed (*M. cynomolgus*), with which species we did not obtain one successful inoculation.

In the case of 7 monkeys, intracerebral inoculation of emulsified brain and spinal cord from infected monkeys failed, but all these failures could be reasonably explained by dying out of the virus during prolonged storage in glycerin, or on other grounds.

Intraperitoneal inoculation of the usual human emulsion (2 monkeys) and of swabs from human contacts (1 monkey); intrasciatic inoculation of the usual human emulsion (1 monkey) and of swabs from human contacts (1 monkey), intracerebral inoculation of human cerebro-spinal fluid (2 monkeys), of Pasteur-Chamberland F filtrates of human material (3 monkeys), of a "Noguchi culture," (1 monkey), of naso-pharyngeal swabs from a human case and contacts (2 monkeys), of material from a horse dying mysteriously (1 monkey), and of an emulsion of fowl ticks found near the dwelling place of a case of "X disease" (1 monkey), and the introduction of the virus into a vein (1 monkey)—all failed.

B. *Sheep.*

Five sheep died within four and a half days of the operation, either as a direct result of this, or of post-anaesthetic lung affection, or of sepsis, and so pass out of consideration.

Six sheep survived intracerebral inoculation of fresh human or monkey nervous material, but showed slight symptoms, probably of encephalitis.

Two sheep showed no symptoms after intracerebral inoculation of the usual human emulsion, but in one case the material had been stored in an ice chest for thirteen days, and in the other the material had failed to induce symptoms in monkeys, and therefore the inference is that the material did not contain the virus at the time of inoculation.

Thirteen sheep showed no symptoms after intracerebral inoculation of the brain and spinal cord emulsion from infected monkeys. We concluded that seven of these sheep possessed natural immunity, and in the case of the remainder reasonable explanations of the failure can be supplied.

Four sheep showed no symptoms after intracerebral inoculation of brain and spinal cord emulsion from other infected sheep. These sheep seemed to be naturally immune.

There was failure to induce the disease in three sheep by intracerebral injection of a Berkefeld filtrate of material from an infected monkey, from which we inferred that the virus did

not pass the pores of this filter, at least in sufficient quantity to induce infection.

A sheep which had its nostrils swabbed with an emulsion of the brain and spinal cord from an infected monkey showed no after-effects.

C. *Other Animals.*

We failed to convey the disease to four dogs, two kittens, three rabbits, two guinea-pigs, and one fowl.

SUMMARY.

1. *Clinically.*—An account of a form of encephalomyelitis, occurring as an epidemic in the late summer of 1917 and 1918, confined almost entirely to certain dry inland parts of New South Wales; appearing as an acute and severe illness, often abrupt in onset, and fatal in 70 per cent. of cases; affecting children mainly but not sparing adults; characterized by general signs of cerebro-spinal irritation—namely, convulsions, rigidity, heightened reflex excitability, mental obfuscation, and loss of consciousness; accompanied by fever and gastric and other disturbances; terminating in exhaustion, coma, and death in a few days, or in rapid recovery, usually complete, but in a few instances attended by flaccid paralysis or mental disorder.

2. *Histologically.*—Exhaustive microscopic examination of the nervous system in 16 cases showed acute encephalomyelitis, universally distributed; characterized by vascular engorgement, "sleeving" of veins with lymphocyte-like cells, isolated "colonies" in and infiltration of the tissues with similar cells, and a tendency to capillary haemorrhage; affecting grey substance more than white on account of the difference in vascular supply; and seldom grossly destructive as in "acute poliomyelitis."

3. *Experimentally.*—By intracerebral inoculation of an emulsion of portions of the parent nervous system the disease has been conveyed from human subject to monkey (*Macacus rhesus*); from monkey to monkey, in series; from monkey to sheep; from sheep to sheep; back from sheep to monkey; and on again through monkeys; and lastly, from monkey to one horse and one calf—all of which results were confirmed by histological examination, showing changes unequivocally corresponding with those found in *homo*.

4. The disease in monkeys was eminently fatal, and was mainly characterized by weakness, drowsiness, and intense inco-ordination of movement. Flaccid paralysis was not a dominant feature. Some sheep gave no response to inoculation, others showed slight or no signs of disease, proving a certain degree of immunity. In the "positive" sheep convulsions commonly caused death. The inoculated horse and calf also died from convulsions.

CONCLUSION.

The disease, from the anatomical standpoint, may be called "acute encephalo-myelitis."

It resembles "acute poliomyelitis" and "encephalitis lethargica" inasmuch as the responsible, undiscovered virus has an evident affinity for the central nervous system; probably requires incubation therein, under favourable conditions, to perfect its nocive power, and produces histological changes which follow the blood vessels, hence suggesting that all three diseases may be due to mutants of the one virus.

On the contrary, however, the individuality of this epidemic; the preponderance of signs of cerebro-spinal irritation; the high rate of mortality; the common affection of adults; the infrequency of paralysis of cranial or peripheral nerves; the widespread changes in the nervous system without gross focal lesions; the susceptibility of the sheep, horse, and calf, as well as the monkey; and the reproduction of preponderating signs of cerebral irritation and of the human histological changes in all these animals, favour the conclusion that the disease is a distinct entity.

AT the last meeting of the Zoological Society of London Mr. E. G. Boulenger, F.Z.S., exhibited a series of living specimens of the British rats and their varieties, and stated that during the past four years there was evidence that the so-called old English black rat had increased in numbers. Lieut.-Colonel S. Monckton Copeman, F.R.S., F.Z.S., read a paper on experiments on sex determination, illustrating his remarks by a series of charts.

TWO OUTBREAKS OF MILD DYSENTERY

ASSOCIATED WITH THE SCHMITZ BACILLUS (*B. AMBIGUUS* ANDREWES).

BY

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SOME clinical and laboratory observations made during the investigations of two outbreaks of a mild form of dysentery during July, 1918, are given in this note. They appear of particular interest from the fact that the laboratory work carried out indicated that the causal organism was the *B. dysenteriae* Schmitz (*B. ambiguus* Andrewes), and that the first outbreak was of rare extent.

In Professor Andrewes's account[1] of his investigations into several strains of bacillary organisms, which he has included in the general term "dysentery group," are detailed his findings when working upon a similar micro-organism, together with some interesting remarks on what have been frequently termed "atypical" dysentery bacilli.

A bacillus of similar biological characters has been isolated from dysenteric stools by several workers in various countries. It has been my previous experience while working in the Mediterranean littoral to isolate it very rarely, and then from the stool of a patient suffering with a mild form of dysentery.

Clinically the cases to be described presented signs and symptoms which resembled those seen in mild cases due to the Flexner-Hiss bacillus. The more severe form of dysentery and the associated toxicity so generally found when the infective micro-organism is the Shiga bacillus were not observed in any case.

The first outbreak was amongst troops belonging to one camp. Those in an adjoining camp remained free from infection. The troops in the camp affected had recently arrived from a distant allied country, while in the other they were British, and had been in Italy for several months. Within the period of one week 12 officers and 350 men, out of a total of 3,000 troops, fell ill with a comparatively mild form of dysentery associated with vomiting and abdominal pain. The onset was sudden and acute. In many there was collapse, and the temperature rose to around 102° F. The duration of the attack averaged three to four days, when the patient was practically able to return to his duties and the stools were normal in consistency and character. There were no deaths.

The stools were numerous during the first twenty-four to forty-eight hours, and frequency persisted exceptionally to five or six days. The stools consisted mainly of mucus and bile-stained watery faecal matter; some contained blood flakes or cells only, but no clots. The mucus in a few was clear and in plaques, while in others it was more opaque and occurred as fine flakes, of colour and consistency varying between clear and white according as the pus and epithelial cells therein were few or numerous.

Microscopical examination of stools showed—save one which contained Lamblia cysts due to a previous infection—an absence of animal parasites and also of vibrios. The micro-organisms present in great numbers were (1) a non-motile short bacillus lying packed in the mucus, (2) a motile bacillus of varying length.

Cultures of Stools.—Special methods were undertaken to determine if culturable vibrios were present, but none were found.

Washed mucus of those stools examined during the first day or two of symptoms showed comparable cultural results when plated on MacConkey media. The predominant colonies resembled those of the Flexner-Hiss bacillus. They proved to be of *B. dysenteriae* Schmitz, a non-lactose fermenting short bacillus, which was found to be non-motile, Gram-negative, and to ferment glucose (without gas formation) and not mannite, saccharose, maltose, dulcite, nor lactose. Gelatin was not liquefied. There was no marked change in the litmus milk as prepared. Fresh milk could not be obtained. The indol reaction was positive in twenty-four to forty-eight hours. The bacillus was not agglutinated in specific anti-Flexner, anti-Hiss, and anti-Shiga animal serums.

B. pyocyaneus was also isolated, but in a much lesser number of colonies from a small proportion of the same stools.

The second and much smaller outbreak occurred amongst the personnel of a military hospital and at a later date. There was a number of similar cases of mild dysentery, accompanied in some with vomiting, and in the cases investigated the *B. pyocyaneus* was not found.

but the Schmitz bacillus again grew in a considerable number of colonies after plating out the stools.

The Schmitz bacillus was not found when some stools from the above cases were examined at a later date and when normal in character. No further cases of dysentery occurred amongst the troops in the same camp or hospital.

The blood serums of seven of the first series of patients taken nine and fifteen days after the onset of symptoms were tested for agglutinability of the Schmitz bacillus and the *B. pyocyaneus* isolated with negative results. Similar findings by the agglutination test on the Schmitz bacillus with the serums from cases at the hospital were obtained. Three strains isolated were submitted to the Michaelis acid test, but after two hours the result was negative in all tubes; after twenty-four hours' standing fine flocculi were obtained in tube No. 6.

It appears that these outbreaks were due to an intestinal intoxication dependent upon the proliferation and mild toxicity of the Schmitz bacillus, and that the pathological condition of the intestine present in more severe forms of bacillary dysentery did not develop. Intestinal disorder, often classed as physiological disturbance due to change of climate and of diet, is not infrequent amongst troops when they are transferred to a country and to conditions new to them, especially during summer months if that country be subtropical or tropical. But the clinical symptoms and signs observed differ from those seen in such a physiological state, and the direct microscopic and cultural results from stool examinations, which showed considerable numbers of the Schmitz bacillus during the time dysenteric stools were passed and none when the stools returned to normal, are such as lead me to accuse this micro-organism of playing some part in these outbreaks, if it be not the real causal agent. Moreover, I have not yet found the Schmitz bacillus in a stool from a patient without a history of dysentery, nor in normal stools.

The troops were allowed to eat raw fruit, and the water in the camp affected was at that period not chlorinated; in the adjoining camp it was. The sanitation officer did not trace the cause of the disease to these sources. The day preceding the second outbreak raw tomatoes had been bought and eaten by many of those who became ill. A similar clinical condition arose amongst troops in Malta after eating raw tomatoes in the summer of 1916.

The micro-organism above described has similar biological characters to the *B. ambiguus* described by Andrewes; his strains gave negative results when small or large doses of aërobic broth culture were injected into a rabbit's vein. Its morphological cultural and fermentative characters are similar to those described by Schmitz for his bacillus in an account of an outbreak of dysentery amongst Rumanian prisoners of war, but the symptoms it produced in man were much less severe, and it did not kill the rabbit as did the bacillus isolated by Schmitz.[2]

The extensive and valuable work of Captain Murray[3] has shown that the bacilli described by Schmitz and Andrewes may be placed in one group, and it will be interesting to learn the comparative results with para-Shiga strains of Dudgeon and others from the Mediterranean littoral.

I beg to thank Lieut.-Colonel J. W. West, C.M.G., R.A.M.C., for permission to publish this article.

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ANAESTHETICS IN A BRITISH HOSPITAL WITH THE SERBIAN ARMY.

BY

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THIS series of anaesthetics was commenced in August 1916, and continued until January, 1918. All the operations took place under canvas in the heart of a country with a subtropical climate. The nationality of the subjects treated was mainly Serbian. The Serbian soldiers were very fit and strong men between the ages of 18 and 50, most of whom had faced the hardship of war, not only during the present struggle, but in the previous Balkan campaigns, and practically all had led an outdoor life. The outstanding features from an anaesthetist's point of view were their good physique, the sound state of their teeth and the absence of dentures; a large percentage did not smoke at all, and those that did were almost all cigarette smokers. A noticeable feature in the early stages was the fear of an anaesthetic. Special account had to be taken of endemic disease (malaria), and occasionally of the effects of dysentery and scurvy in their relation to cardiac complications.

In the first series many of the wounded were in a state of exhaustion on admission, owing to difficulties of transport. Where possible, these cases were allowed to rest for some hours before operation.

The methods of administration adopted were as follows:

1. Open administration of a mixture (ether 2 parts, chloroform 1 part), with and without previous administration of morphine.
2. McCardie's mitigated ether method with open E_2C_1 sequence (with and without previous administration of morphine and atropine).
3. Closed ether, sometimes with oxygen.
4. Nitrous oxide.
5. Nitrous oxide-ether sequence.
6. Nitrous oxide with oxygen (improvised).
7. Chloroform (Junker's bottle).
8. Combination of methods 1, 2, 3, and 6 with local anaesthesia.

Methods 1 and 2 were the most frequently employed; they were given in a series of cases, with and without previous alkaloidal administration, and the results were compared. The cases which had not had a previous injection of alkaloids were in general head cases and thoracic injuries. The administration of E_2C_1 mixture was sometimes preceded by ½ to 1 drachm of chloroform given drop by drop on a Schimmelbusch frame covered with 12-ply gauze and a layer of lint (with a small hole the size of half a crown in the centre) over all. In this method the morphine when given was in doses of ¼ or ⅓ grain one hour to one hour and a half before operation, as nearly as it could be gauged. At this stage no atropine was given.

The anaesthesia obtained was as a whole very satisfactory. Induction was rather slow (about six to eight minutes on the average), and in cases newly admitted from the trenches it was often accompanied by great excitement and struggling, whether morphine had been given or not. The maintenance of anaesthesia was as a rule even and regular; there was little vomiting, and no respiratory disturbance or salivation. It was noted that those patients who had morphine took a little less anaesthetic, and generally the induction was quieter and a little quicker. Signs of shock on the table were absent, except in a few cases where the operation had been prolonged and severe, or where haemorrhage had occurred. The period of recovery was quiescent.

1. E_2C_1—*Schimmelbusch Frame.*

The following summary shows the quantities of anaesthetic used:

(*a*) With preliminary morphine: 333 operations; average length of operation 37.9 minutes; average quantity per operation 11.3 drachms; or, taking an operation of thirty minutes' duration, 8.7 drachms.

(*b*) Without preliminary morphine: 231 operations; average length of operation 33.1 minutes; average quantity per operation 10.6 drachms; or, taking an operation of thirty minutes' duration, 9.6 drachms.

It will be noted that there is not a big difference in the quantities used in the two classes, the cause being chiefly absence of the ideal conditions for complete success with preliminary alkaloids, such as quietness of surroundings, subdued light, and smooth transport from ward tents to theatre. However, the other benefits were obtained. With regard to the quantities used as compared with open ether administration, the figures given by Silk[1] and others are 6 to 8 ounces an hour, or even 8 to 10 ounces an hour in Malta.

2. *McCardie's Mitigated Ether.*

In this procedure a Clover apparatus is used into which 1 oz. of ether, with half a drachm of chloroform, are placed in the container, and 21 minims of E_2C_1 mixture in the bag. The facepiece is closely and firmly applied; induction is commenced by rebreathing from the bag only for forty to sixty seconds, and followed by turning on the mitigated ether. Watch is kept for cyanosis, and if this appears (which is rare), one or two breaths of air are given. Induction was almost always easy, quiet, and rapid, taking four or five minutes. Anaesthesia with these quantities lasted from fourteen to twenty minutes, when, if the operation required it, open E_2C_1 followed.

Those cases which had a previous alkaloidal administration were given morphine gr. ¼ and atropine gr. $\frac{1}{100}$, half an hour before operation as nearly as possible.

The advantages gained from this method were confirmatory of those claimed by McCardie,[2] namely—

1. The respiratory irritation due to ether vapour by the closed method is much mitigated by the addition of a small quantity of chloroform.
2. The addition of chloroform in this amount distinctly saves the work of the heart and lungs in a long or severe operation.
3. The mixture is practically as safe as ether alone.
4. It is valuable as a routine method of inducing anaesthesia, being safe and rapid.
5. A few drops of E_2C_1 mixture are preferable to ethyl chloride as a preliminary to the administration of the mitigated ether.
6. For maintenance of anaesthesia E_2C_1 mixture by the open method is preferable to even mitigated ether, owing to the prevalence of respiratory irritability in soldiers.

The following summary shows the total quantities of anaesthetic used with and without previous alkaloids:

(*a*) With alkaloids: 214 operations; average length of operation 30.1 minutes; average quantity used 13.2 drachms; or, for operation of 30 minutes, 13.12 drachms.
(*b*) Without alkaloids: 100 operations; average length of operation 29.06 minutes; average quantity used 14.4 drachms; or, for operation of 30 minutes, 14.7 drachms (that is, including the original 1 ounce of ether and half a drachm of chloroform put into the Clover inhaler).

3. *Closed Ether.*

This was only used in 65 cases, 26 with previous alkaloidal treatment and 39 without.

(*a*) With alkaloids: 26 operations; average length of operation 42.03 minutes; average quantity used 17.8 drachms; or, reduced down to an operation of 30 minutes, 12.6 drachms.
(*b*) Without alkaloids: 39 operations; average length of operation 35.1 minutes; average quantity used 16.1 drachms; or, reduced down to an operation of 30 minutes, 13.6 drachms.

This method was adopted in several cases of a severe type, such as high amputations, and also in slight cases. In the first it was often accompanied by oxygen and occasionally warmed by placing a little hot water in the bag, as recommended by Beresford Kingsford.[3] I abandoned it for general use on account of various well known disadvantages, such as respiratory discomfort, salivation (particularly prevalent in Serbs), and also the objection by some patients to a closed apparatus. The addition of oxygen helped materially in lessening the amount given, and easing induction.

4. *Nitrous Oxide.*

This was given frequently for minor operations in 111 cases, including some dental ones. The apparatus in use was of the simple ordinary variety, with an arrangement for rebreathing. It was found very efficient, especially if given by the rebreathing method with intervals of air breathing according to stage of narcosis, the aim always being to avoid any cyanosis. The use of a rubber dental prop, as Boyle suggests, is a great advantage; it aids induction and ensures easy ingress for the gas or air, especially if there is the slightest sign of nasal obstruction.

5. *Nitrous Oxide–Ether Sequence.*

This was adopted in some forty-five cases, and gave very satisfactory results. The type of case generally chosen was the minor or short operation, and in which there had been no antecedent alkaloidal preparation. Here again the rubber dental mouth prop is advantageous.

6. *Nitrous Oxide with Oxygen.*

This was employed only twice, in an improvised fashion, owing to the lack of any suitable apparatus, such as that recommended by Captain A. S. Wilson.[4] Rough and ready as the method was, it proved of great value in two cases of amputation of the thigh, in which the patients were very weak from chronic sepsis. In both novocain was injected at the site of amputation, and in one ¼ grain of morphine was given one and a half hours before. The operations were performed quickly, there were no signs of shock, and recovery from anaesthesia was rapid and without any incident, such as vomiting.

7. *Chloroform.*

This was only used in operations on the face and lower jaw by means of a Junker's bottle. The proportion of these cases was not large, and no special difficulties were met with. The chloroform was introduced by means of a soft rubber catheter passed five inches down the nose.

8. *Local Anaesthesia.*

This was frequently used alone or in conjunction with a general anaesthetic in operations on the head and chest, and for amputations. It certainly aided in diminishing the amount of anaesthetic used, and in limiting shock or disturbance during section of nerve trunks. In thoracic operations the method is of great value.

General Remarks.

By the use of alkaloids liability to shock on the table is decidedly diminished, and the amount of anaesthetic required is less. The period of recovery is of a more quiescent character. It is contraindicated in cranial cases, especially where mentality is impaired, and in the recently severely wounded who are already suffering from shock. Care should be taken when any heart muscle weakness exists or is suspected from such causes as malaria or chronic sepsis.

The choice of anaesthetic should be based on such considerations as the following:

1. Whether the wound is of a severe character and accompanied by shock.
2. The period of time that has elapsed since its infliction.
3. Whether haemorrhage has occurred or is likely to occur.
4. Whether an acute infection is present (notably gas infections) and the operation is likely to be of the nature of an amputation.

It is in the last named cases that the greatest dangers are likely to be met, but these are considerably diminished if the patient can have some hours' rest in bed with the application of external warmth. In such cases the best results have been obtained with an induction by McCardie's method, or warmed ether, and oxygen.

In abdominal cases McCardie's method was used with advantage, followed by ordinary closed ether and oxygen, if necessary. The use of oxygen is insisted on, as it acts as a stimulant, improving the anaesthesia and diminishing the amount of anaesthetic used.

I am specially in agreement with Captain Geoffrey Marshall's[5] remarks on the choice of gas and oxygen in wounds of the limbs requiring amputation, and the withholding of morphine. His recommendation of it for smaller operations as a routine method is very timely.

For the average type of case which has been in hospital a little time and for operations of expediency the best results have been obtained by McCardie's method, and, secondly, by the open administration of E_2C_1 mixture. These have the advantage of simplicity, ease, quietness of induction, and economy.

After-Results.

In some cases in which haemorrhage had occurred the use of E_2C_1 mixture was followed by collapse, which caused anxiety and necessitated the administration of intravenous saline.

Vomiting did not often occur during the course of operation, but chiefly when the patient was moved, in the application of dressings or transference to a stretcher. In the wards it occurred very seldom. There were no cases of delayed chloroform poisoning.

Chest complications were very few in number—not more than four or five in all (two of bronchopneumonia of a mild type, and the rest bronchitis). All recovered.

There were no fatalities.

I have to thank the operating surgeons, Major G. P. Mills and Lieutenant John H. Watson, for their constant help and suggestions, and the other members of the unit with whom I was associated in the work.

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ANTIMALARIA MEASURES IN ENGLAND.

BY

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THE record of the occurrence and control of malaria, imported and indigenous, in England will be published for the War Office by the consultant in malaria. Permission is granted for a brief summary to be given before the British Medical Association.

Carriers.

From various seats of war cases of malaria in all stages of the disease have returned to England during the years 1916–19. Necessity for control was anticipated, and was inaugurated by the War Office from the date of first return of infected troops. As malaria infection is consistent, both in officers and men, with "carrying on," infected troops returned to their units, where they were dealt with as variously required, and were thus distributed throughout the country.

Dangerous Areas.

Historical evidence and indigenous occurrences in 1917 determined the institution of special measures of control in areas of great anopheline incidence, especially in Sheppey, Sandwich, Romney Marsh, and Essex. Local conditions modify the effect of anopheline incidence; but in Sandwich and Sheppey abundance of anophelines coincided with large aggregation of troops and intimacy of infectivity.

Indigenous Malaria.

Incidence and Distribution in 1917 and 1918.

Situation.	1917. No. of Cases.	1918. No. of Cases.
Sheppey	68	31
Sandwich	69	6
Elsewhere	26	24
Total	163	61

Seasonal Distribution of Malaria Occurrence and Infection in 1918.

Occurrence.		Infection.	
Date.	No. of Cases.	Probable Date.	No. of Cases.
1918.			
May	3	May	4
June	2	June	2
July	1	July	3
August	22	August	47
September	29	September	4
October	4	October	1
Total	61		61

All cases in 1918 were specially investigated. Malaria was authenticated of all. Indigenous origin was established by the absence of possibility of foreign infection. The locality of infection was assumed by the demonstration of (1) the disease, (2) intimate contact with carriers, (3) the presence of anophelines.

In nine cases assumed to be indigenous and contracted in May, June, and July, protozoal incubation of resting mosquitos (a notorious anopheline habit) in artificially heated premises, is postulated, to account for infection at a date when atmospheric temperature was probably not sufficiently high to cause "natural" infection. The other infective conditions were present. One occurrence in June it was preferred to accept as a latent infection from 1917. Some conditions were present, all were possible, in June; but undoubtedly all conditions had been present in August, 1917. The majority of infections, as might be expected, occurred in early August.

General Antimalaria Measures.

The general antimalaria measures were as follows:

(*a*) Supervision by malaria expert.
(*b*) Blood examination of doubtful pyrexia.
(*c*) Supervision of troops from overseas.
(*d*) Segregation and screening of carriers.
(*e*) Special instruction of medical officers.
(*f*) Quinine treatment of case and carrier.
(*g*) Entomological investigation.

Of these provisions, (*a*), (*b*), (*c*), (*e*), and (*g*), aided detection and stimulated control and treatment; (*d*) and (*f*) are of direct preventive value, the former in diminishing the chances of biting and transmission, the latter by reducing the infective power of the individual, who in the vast majority of the cases dealt with was a carrier of the *Plasmodium vivax*.

Antilarval and Antimosquito Measures.

These measures, definitely sanitary, were adopted mainly in the "dangerous areas"—Sheppey, Sandwich, Romney Marsh. Labour difficulties were general, but least felt in Sandwich, where the most accurate work was accomplished.

Destruction of Mosquitos in their Winter Quarters.—*A. maculipennis* is the main domestic danger in England. She winters where the conditions obtainable are warmth, freedom from draught and disturbance, shade, and food. These are to be found within buildings where cattle (kine, horses, pigs, etc.) are housed. During summer months these conditions are to be found more readily in relation to human dwellings; cattle are rarely or but temporarily housed; *maculipennis* wanders and finds rest, shade, warmth (at natural temperature), quietness, and food in man's sleeping quarters. Farm steadings—stables, cowsheds, pigsties—have been cleared of mosquitos in winter months. Those not killed directly could not live exposed to winter temperatures outside. Repeated operations in these buildings were aided by thorough whitewashing, which enables ready detection. The common dense shroud of cobwebs conceals the mosquitos. The effect of this destruction has been obvious in districts operated. Where "myriads" were recorded on March 4th, 1918, six were with difficulty found on March 4th, 1919. In districts under observation, not operated, *maculipennis* prevalence in 1917, 1918, and 1919 has not varied.

Prevention of Larval Development.—For every wintering *maculipennis* destroyed there are probably hundreds of larvae kept from existence. But direct attack on breeding places so supplements the process of limitation that elimination locally is feasible. *Maculipennis* larvae depend for their chances of existence on the presence of vegetation in and on the surface of the waters. The whole aim of antilarval measures has been so to treat all breeding places as to maintain a clear exposed water surface, bottom and sides free of vegetation, and banks trained and devoid of overhanging growth. In Sandwich, besides operations on notoriously infested waters at wider range, more than twenty miles of dykes have been kept trained and free of weed, all within the camp area and in intimate relation to an aggregation of some 30,000 men, harbouring a carrier volume not readily ascertainable. The result of the combination of operations has been rarity of *maculipennis* within military quarters, absence of larvae from treated dykes, and a record of six indigenous cases in 1918 as against sixty-nine in 1917. These six also resulted from a local defect in detail. In Sheppey, where circumstances did not allow of so thorough measures being carried out, there is reduction from sixty-eight to thirty-one military cases, and from thirty-five to fourteen amongst civilians, owing to the protection of military operations.

GENERAL CONSIDERATIONS.

Attempts at the practical prevention of malaria have been threefold, and all over the world they have been tried separately and in combination.

1. Quinine treatment and prophylaxis.
2. Personal protection—by screening, netting, and repellants.
3. Direct limitation of mosquitos.

Notwithstanding theoretical and real minimal value, quinine as a preventive of malaria is practically valueless. For the individual netting is a sheet anchor; for the community it is valueless.

The direct limitation of mosquitos is the only proven measure of practical value; its application is direct and local, not vague and distributed; it is inexpensive, and can be effected by the existing personnel, rightly directed, of any and every sanitary establishment, and in sound practical hands its results are absolute. Its value has been demonstrated in the past twenty years all over the world, and is not to be set aside by the imaginative predilections of administrative propagandists and the unpractical *ipse dixits* of students of the *in vitro*. And now from the different seats of war reports show the valuable work done and obvious good results obtained. Every

practical sanitarian (and many health officers from this country have had their opportunity and made good) who has handled malaria prevention has received results, and knows that thus only is success to be achieved.

It may seem somewhat parochial in a subject of such universal interest to bring forward evidence from limited operations in England; but they have been unique, in that it is the first opportunity that has existed of studying indigenous malaria in England with the knowledge of its entity.

I briefly sum up the evidence of recent ocurrences in England in proof of the value of definite sanitary operations in the prevention of malaria. And as far as England is concerned, while it would be absurd and uncalled for to institute antimosquito measures throughout the entire area of anopheline distribution, there may be parts of the country where the coincident distribution of vehicle and carrier may be intense. In these it may be incumbent on authority to adopt the proven measures of malaria prevention.

Summary.

1. Mosquito prevalence was similar in 1917 and 1918.
2. Conditions for indigenous infection existed both in 1917 and 1918.
3. Carrier population was increased in 1918.
4. Where general measures were adopted, but when control was more accurate, the scattered occurrences in 1918 were 24, as against 26 in 1917.
5. Where sanitary measures were added to the scheme of prevention, as in Sheppey, the cases in 1918 number 45, as against 103 in 1917.
6. Where more accurate operations were attained in Sandwich the number of indigenous cases fell from 69 to 6.

THE ELECTRICAL CHANGES IN ACTIVE TISSUES.

ABSTRACT OF THE SILVANUS THOMPSON MEMORIAL LECTURE GIVEN BEFORE THE RÖNTGEN SOCIETY ON MAY 6TH, 1919.

BY

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THE phenomena of electrical changes in active tissues have been a favourite subject of investigation by physiologists, no doubt greatly on account of the accurate methods of measurement available, even at a comparatively early date. Although electric fish were known to the ancient world, and the effects of their discharges were described by Aristotle and Pliny, it was not until about 1780 that Galvani discovered similar properties in ordinary muscle, naturally much less intense, and requiring delicate methods to detect them. Matteucci in 1838 appears to have been the first to use the galvanometer in their investigation, and the work of Du Bois-Reymond was only a little later. Before long, these properties were shown to exist in nerve, in glands, and in smooth muscle.

It is not my intention to discuss the details of all these cases, but rather to direct attention to certain facts which throw light on their manner of production and their significance. It may be pointed out that electrical changes are not in themselves of great importance, but rather as indicating the existence of phenomena otherwise difficult or impossible to investigate.

Since the introduction of the theory of electrolytic dissociation of conductors in watery solution, it has been realized that we must look for the explanation of the facts before us on the basis of the movement and redistribution of ions. The body may be regarded as a framework of non-conducting material, immersed in and soaked by solutions of electrolytes. Evidence derived from many and various sources shows that living cells are surrounded by delicate membranes, which allow water and certain solutes, such as urea and the lower alcohols, to pass through freely, but refuse passage to the majority of salts, to sugars, etc. It was pointed out by Ostwald in 1890 that if a membrane is impermeable to one of the ions into which a salt is dissociated, it is indifferent whether the oppositely charged ion can get through or not, because this latter can only leave the neighbourhood of its fellow for a very small distance on account of the great magnitude of the electrostatic attraction between them. It will therefore form a layer on the outer side of the membrane, while the opposite ions form a layer on the inner side. This is the "electric double layer" described by Helmholtz, and is clearly the cause of a difference of potential between the two sides of the membrane.

Now Bernstein in 1902 showed that if we suppose the membrane of the muscle cell to be impermeable to certain anions but permeable to certain cations, the latter will form an outer layer with a positive charge, while the interior of the membrane will have a negative charge. He showed, moreover, how all the facts of "muscle electricity" are explicable on this view. What the particular ions are it is as yet impossible to state; but those of potassium phosphate seem to be the most probable.

What, then, are the facts to be explained?

1. Since the whole of the surface of the cell is supposed to be possessed of the membrane in question, it is easy to see that application of electrodes connected to a galvanometer should show that it is equipotential at all points. This is the case with uninjured muscle and also with nerve.

2. Suppose that the two electrodes are placed at different points and that we injure the membrane under one of the electrodes, so that it becomes freely permeable to both ions. The double layer ceases to exist at the injured point, the ions freely mix, and the electrode is in connexion with the interior of the cell—that is, the negative component of the double layer at the normal parts of the surface. We have what is called the "current of injury" or "demarcation current," in which the injured spot is negative to the uninjured parts. It is to be noted that the older theories regarded the changes at the injured spot as the source of the current, while the new view regards the uninjured surface as the source. Bernstein was able to decide the question in the latter sense by warming locally. The demarcation current was unaltered by warming the injured spot, increased by warming the normal place. The effect of temperature was also used to decide between a physical theory, such as that spoken of, and those theories which attributed the phenomena to chemical reactions at the injured spot. The magnitude of the current of injury was found to be proportional to the absolute temperature and not to have the high temperature coefficient of a chemical reaction.

3. The current of injury disappears more or less quickly, as it should do if the electrolytes within the cell diffused away at the permeable injured place.

4. There is evidence that increase of permeability is a general characteristic of the state of activity. Details of this evidence are beyond the limits of this account, but, accepting them, we may examine what would happen if we led off from the normal surface and from an injured spot and then stimulated the muscle to contract. The normal surface would approximate more or less completely, as regards its permeability, to the injured spot, the double layer would disappear and with it the source of the current of injury. This was called the "negative variation," that is, the decrease, of this current.

5. If both electrodes are on uninjured spots and a wave of excitation passes along the muscle, as it passes one electrode it makes this one negative to the other, and then, leaving the former, it reaches the second and makes this negative to the first. We have a current first in one direction, immediately followed by one in the opposite direction. This is the "diphasic variation."

Their impermeability to ions makes cells bad conductors of electrical currents. Their resistance thus decreases in the state of activity or when the membranes are destroyed. This is the basis of Stewart's method of determining the proportion between the corpuscles and the plasma in the blood. It also accounts for the high resistance of nerves in the transverse direction.

The main fact that an active spot in muscle or nerve is negative to one at rest is therefore accounted for satisfactorily on the "membrane theory" of Bernstein.

As instances of the use of the fact may be mentioned Lewis's localization of the pace-maker in the mammalian heart and the extensive use of the electrocardiogram in practice. It is beyond the object of this lecture to discuss the meaning of the components of the latter, but a word of warning should be given against hasty interpretation of details in the curve. Slight changes in the duration of the excitatory state at one electrode may produce fundamental alterations in the electrocardiogram, while the heart beat, as far as its essential mechanical effects are

concerned, shows no change of practical importance or detectable by any other method.

The passage of impulses along a nerve cannot be detected directly in any other way than by the electrical effect. Einthoven has been able to show the passage of impulses in the vagus nerve when the lungs are distended or collapsed, and also in the depressor nerve when the blood pressure rises in the aorta. Piper has determined the rate of discharge of motor innervation. The method is capable of further extension to reflexes, and possibly the vexed question of the analysis of sounds by the cochlea may be decided.

The electrical changes in secreting glands are more complex than in nerve and muscle, and are not yet completely understood. The main component is undoubtedly connected with the flow of water, as shown by Bradford and myself, and to explain it we may consider briefly the nature of the secretory process in general. The cells possess the same kind of membrane as muscle has, but their impermeability appears to be to certain cations of the cell contents, not to anions, as judged by the sign of the electrical effects. This is, however, a matter of detail. During rest there is formation of complex substances to be used in the act of secretion. This is an automatic process, requiring the supply of energy by oxidation, and comes to an end by mass action of the products. When secretory activity occurs, two things happen. The stored products are split into smaller molecules, so that the osmotic pressure of the cell contents rises and water is attracted. But simultaneously that end of the cell in relation to the duct becomes permeable. Water flows out, carrying the secretory products. The electrical effect is accounted for in a way similar to that in the case of muscle. But there is also another component of the electrical change, smaller in magnitude and opposite in sign to that associated with the permeability effect. This is seen when the sympathetic supply to the submaxillary gland of the dog is stimulated. Its origin is unknown.

Sweat glands in the skin show the phenomenon of an electrical change. They are readily excited reflexly and, as Tarchanov and Wells and Forbes have shown, also by psychical events. It seems practically certain that the "nerve-leaks" of Baines are due to local activity of sweat glands. These may possibly be of use in the location of pathological processes in the central nervous system, but there are simpler means of detecting local sweating.

Waller has investigated the changes of resistance in the skin, which are associated with mental states, and proportional to the degree of the emotion. The phenomenon is called by him the "emotive response," and he is inclined to doubt its origin from sweat glands. But the evidence derived from atropine is not very satisfactory. The way in which the decreased resistance is produced in active cells has been described above. The reaction may be found useful in the process of "psycho-analysis" and has been used by Wells and Forbes in psychological investigations.

Photochemical reactions are associated with electrical changes, and the phenomena in the retina have been the object of much attention. They are complex in the vertebrate retina, probably on account of its mixed structure. In the cephalopod the effect of light is simple. When better understood, they will doubtless help to explain the retinal processes. The action of light on the green leaf has been shown by Waller to be accompanied by electrical effects. This again requires further work.

Finally, the process of inhibition in heart and smooth muscle may be referred to. Since *increased* activity means increased negativity, it is clear that *decreased* activity should be associated with decreased negativity. This was shown by Gaskell to occur in the tortoise auricle on stimulation of the vagus. In the ureter, it appears that a wave of inhibition precedes that of contraction, which propels the drops of urine downwards, a process similar to that described by Starling and myself in the case of the intestine. This would naturally result in a double electrical effect at each electrode and a complicated curve of the total effect, such as is described by Orbeli.

AT the twenty-ninth annual meeting of the Association of Medical Colleges in Chicago a new constitution and by-laws were adopted, the principal modifications being in the high school and college requirements for admission to medical schools.

Lettsomian Lectures

ON

JAUNDICE: WITH SPECIAL REFERENCE TO TYPES OCCURRING DURING THE WAR.*

BY WILLIAM HENRY WILLCOX, C.B., C.M.G.,
M.D. LOND., F.R.C.P. LOND., COLONEL A.M.S.,
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LECTURE III.—PART I.

EPIDEMIC CATARRHAL JAUNDICE.

THIS disease was very frequent in the Dardanelles campaign, in Egypt, and in Mesopotamia, and there is no doubt that it occurred frequently also in other war areas. The symptoms and course of the disease form a characteristic clinical picture, and undoubtedly constitute a special type of jaundice the exact pathological cause of which has not been ascertained.

I have had the opportunity of studying closely a very large number of cases, particularly in the Dardanelles and Mesopotamia, and the advantage of the co-operation of distinguished bacteriologists who have made the most painstaking and thorough examinations. From my own clinical observations, and from the results of these bacteriological examinations, I have not the slightest doubt that the epidemic catarrhal jaundice was a special entity, entirely distinct from spirochaetosis icterohaemorrhagica.

The first published clinical description of the disease was by Lieutenant E. B. Gunson, R.A.M.C., and Lieutenant I. W. C. Gunn, R.A.M.C.,[1] who gave an interesting and accurate account of a series of cases in British troops at Alexandria in June, July, and August, 1915, nearly all from a single camp. In July, 1915, at a general hospital in Alexandria, the late Lieut.-Colonel Lister, R.A.M.C., who was in command of the Medical Division, kindly showed me a number of these cases, and I had the opportunity of examining them. I should like to take this opportunity of expressing the great admiration and regard of all who knew him for the skill, sympathy, and devotion shown by Lieut.-Colonel Lister in the splendid medical work which he carried on unremittingly in Egypt even when stricken himself by an incurable malady which later called him from us.

On February 26th, 1916, an account of the epidemic jaundice in the Dardanelles was published by myself.[2]

In 1916 Major R. S. Archibald, R.A.M.C., and his fellow workers, Captains Hadfield, Logan, and Campbell, in their bacteriological reports[3] from the Mudros laboratories, gave a full account of a great deal of careful work carried out on the cases of jaundice at the Dardanelles. On April 7th, 1917, a paper on the pathology and etiology of this disease was published[4] by Lieut.-Colonel C. J. Martin, A.A.M.C. Hurst also refers[5] to the disease in his book on the *Medical Diseases of the War* (1917).

In Mesopotamia I have studied closely a very large number of cases of this type of jaundice, and the most thorough and exhaustive bacteriological investigations have been carried out by Major Mackie, I.M.S., Major Gloster, I.M.S., Major Stevenson, I.M.S., and Captain Short, I.M.S.

SYMPTOMS.

The patient had usually some abdominal discomfort for a few days, associated with anorexia, nausea, perhaps occasional vomiting, and either diarrhoea or constipation. Sometimes there was a history of diarrhoea or dysentery during the previous few weeks.

Pyrexia of a mild type would now generally set in, associated with some chilliness and occasionally some shivering. The tongue was moist and often furred, but might be quite clean. Vomiting often occurred at this stage, and slight headache was common. "Pains all over" were sometimes mentioned in the early stage of pyrexia. Abdominal discomfort was usually present in the hepatic and epigastric regions. The pyrexial period in some cases lasted only one or two days, but was generally

* Delivered before the Medical Society of London, April-May, 1919.

from two to four days; rarely it lasted longer. (See charts.)

About the third or fourth day from the onset of pyrexia jaundice occurred; it was slight at first, but gradually deepened and became of the ordinary obstructive type, with pale stools and bile-stained urine. The jaundice usually attained a maximum in about ten days and then gradually subsided, but the duration and intensity of this symptom varied.

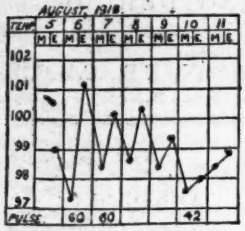


CHART 1.*—Jaundice appeared on August 9th.

Definite uniform enlargement of the liver could be made out by palpation as the jaundice developed, slight tenderness being present. Some cases showed definite swelling in the gall bladder region, and in about 10 per cent. of cases palpation afforded indications of enlargement of the gall bladder.

Enlargement of the spleen accompanied that of the liver, and the organ could usually be felt extending on inspiration for half an inch or more below the left subcostal border. With the subsidence of the jaundice the enlargement of the liver and spleen gradually diminished.

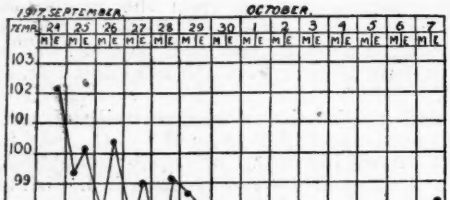


CHART 2.—Jaundice was present on September 24th; on the 26th, liver and spleen enlarged, right heart dilated.

During the pyrexia the pulse was quickened to 80 or 90, but with the onset of jaundice it became slow—about 50 in some cases.

With pyrexia lasting three or four days or more a definite increase in the deep cardiac dullness could be made out about the third day, and the interesting feature was that the dullness was mainly on the right side; on percussion in the fourth intercostal space to the right of the sternum the dullness extended one or two inches to the right of the sternal border. The late Dr. D. B. Lees, to whose masterly teaching of physical signs so many of his pupils will ever be indebted, pointed out this phenomenon in cases of acute rheumatism many years ago. I know of no acute disease other than these two in which specific dilatation of the right side of the heart occurs without any lung involvement or mechanical causes to produce backworking. This cardiac condition in epidemic jaundice was first pointed out to me by Lieut.-Colonel Lister in Alexandria, and I have since confirmed it by observation in a large number of cases both in the Dardanelles and Mesopotamia. With rest in bed no symptoms of cardiac embarrassment occurred. The cardiac dilatation usually lasted for four or five days only, and then subsided.

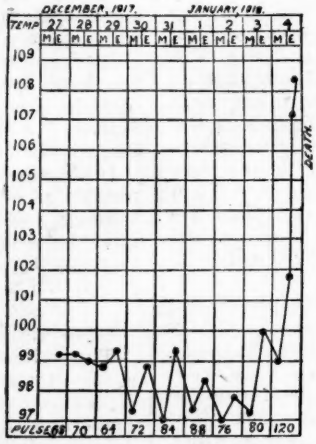


CHART 5.—Jaundice before admission. Patient vomited on December 31st; the following day he was dull and morose; was delirious on January 2nd; coma supervened on January 3rd, and he died on January 4th. *Post-mortem:* Acute yellow atrophy of liver.

The urine in the jaundice stage showed the presence of bile as in obstructive jaundice. Albumin and casts were absent, save in those exceptional cases developing icterus gravis. The duration of the obstructive jaundice stage was not sufficiently long for such skin complications as pruritus, boils, etc., to appear. Anaemia, herpes, congestion of the conjunctivae, and haemorrhagic symptoms were not observed, and special nervous symptoms other than asthenia and depression did not occur in the ordinary type of case. A secondary rise of temperature in the course of the illness was very uncommon.

It is important that a correct perspective should be obtained of the disease "epidemic catarrhal jaundice." I have very careful notes of sixty-four consecutive cases at the Officers' Hospital, Baghdad, made by Captain Woodhouse, R.A.M.C., who was in charge of them. I saw these patients in consultation with him many times, and can confirm the careful accuracy of his records. Of these cases sixty-three were of the mild type described above. I will quote the notes of three of them taken at random.

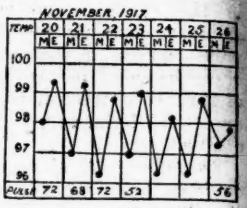


CHART 4.—Jaundice appeared three days before admission. November 26th, stools yellow.

CASE I.

Lieutenant F. Diarrhoea and abdominal discomfort for four days, then slight fever, reaching 102.5° F. on the sixth day, and since then normal temperature. On the eighth day tongue lightly furred; icteric tint of skin and sclerotics now noticed. The deep cardiac dullness was increased to right, liver enlarged, tenderness over gall bladder. Urine contained a considerable amount of bile, stools clay coloured. He made an uninterrupted recovery and was convalescent on the twenty-sixth day.

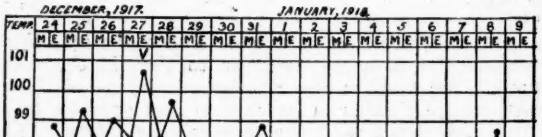


CHART 3.—Jaundice appeared five days before admission to hospital. V, Vomited.

CASE II.

Lieutenant G. Nausea and feeling of illness with slight diarrhoea for seven days; he passed some mucus on the seventh day, but no dysentery organisms were found on examination. Jaundice appeared on the sixth day. On examination on the tenth day liver enlarged and tender with tenderness over gall bladder, spleen palpable, urine contained bile, and stools were pale. Marked anorexia, depression, and pain and tenderness over the liver continued up to fourteenth day; on this day he vomited after an enema. The liver and spleen now gradually diminished to normal size and he made an uninterrupted recovery, being transferred down stream on the twenty-sixth day of the illness.

CASE III.

Captain J. Nausea and occasional vomiting, with constipation for four days, then slight fever. Jaundice appeared on seventh day. The liver and spleen were slightly enlarged (tenth day). Heart not dilated. Jaundice commenced to disappear on the thirteenth day and on the twenty-third day patient was convalescent.

Usually cases of epidemic catarrhal jaundice gave rise to no anxiety, though I have occasionally seen much hepatic enlargement in which most persistent vomiting occurred from the eighth to the twelfth day, and in one case rectal feeding had to be adopted.

In patients with marked hepatic and splenic enlargement convalescence was slow, and they were not usually fit for duty within two or three months.

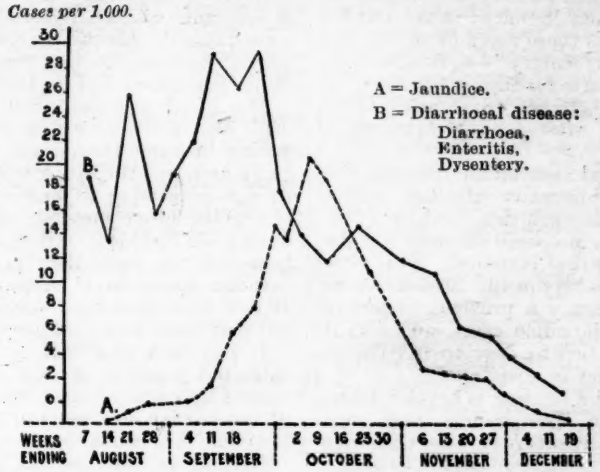
TREATMENT.

The treatment of the ordinary type of case consists of rest in bed and light diet, with saline aperients and an alkaline mixture of potassium citrate and sodium bicarbonate. It is advisable to give oranges, and drink made from fresh lemon juice as antiscorbutics. In the treatment of such conditions as jaundice, the enteric group, or dysentery requiring special diet for a long

* All the charts are of cases of epidemic catarrhal jaundice.

period in hot climates, the rapidity with which scurvy or vitamine deficiency diseases will develop must always be borne in mind.

In the Dardanelles I called attention [6] to the development of multiple neuritis of beri-beri type in several cases of epidemic jaundice. This was undoubtedly due to the rigid dieting on sterilized foods, no fresh food being available for such cases. Calomel in small repeated doses should never be given in cases of epidemic jaundice, because, as was, I think, first pointed out by me,[2] there is here a great liability for the development of severe mercurial stomatitis. I saw several such cases in the Dardanelles. A single dose of calomel may be given without danger, but it and other powerful purgatives are best avoided.



CURVE 1.—Showing the incidence rate of epidemic jaundice and diarrhoeal diseases in the Dardanelles, per 1,000 troops in one division, for the period August 7th to December 19th, 1915.

Development of "Icterus Gravis" Symptoms.

Although, as already described, epidemic catarrhal jaundice usually runs a mild course without any serious symptoms, one can never be quite free from anxiety as regards a patient. In rare cases at some period of the jaundice stage acute toxic symptoms may develop exactly as in "icterus gravis," and almost invariably death ensues within about two or three days of the onset of the grave symptoms. I have seen several such cases and have notes of fifteen, on most of which careful *post-mortem* examinations were made.

The grave symptoms usually occurred a few days (about ten) after the appearance of the jaundice, in one case two days, in another four, while in one case the interval was as long as twenty-nine days.

There appeared to be no relation between the depth of the jaundice and the development of the grave toxaemia. Some cases were not deeply icteric at the onset of the toxaemic symptoms, but the jaundice increased as these developed. The preliminary symptoms of the illness were exactly like those of the ordinary type of the disease and gave no warning of the future grave development. In one case the symptoms of the preliminary stage of the jaundice were so slight that the patient did not report sick.

CASE I.

In January, 1917, when our troops were busily engaged in the fighting around Kut, preceding the crossing of the Tigris at Shumram and advance to Baghdad, an Indian soldier was sent from the front line to a field ambulance because of the development of curious mental symptoms. He had been found wandering about naked though the weather was very cold, and his mental condition was quite abnormal. I saw him on admission when he was markedly jaundiced; he had slight delirium and the liver dullness was considerably diminished. He rapidly became comatose and died in forty-eight hours, from typical symptoms of acute yellow atrophy of the liver.

This was undoubtedly a case of epidemic catarrhal jaundice in the course of which icterus gravis developed. I quote three other very interesting cases on which careful pathological examinations were made:

CASE II.

Gunner R. had had jaundice for eight days with the usual symptoms of the epidemic catarrhal type, temperature normal. At 10 a.m. on the ninth day, coffee-ground vomit with streaks of blood, tremors, and drowsiness. At 5.30 p.m. he was delirious and shrieking; at 6 p.m. comatose, Cheyne-Stokes breathing, knee-jerks present, extensor plantar reflex, and incontinence. The liver dullness was much diminished, measuring only 2½ in. vertically; deep coma persisted. On the morning of the eleventh day the temperature rose suddenly from normal to 104°, and death occurred.

Post-mortem Examination.—Liver small, yellow, with small dark-reddish areas. Kidneys: epithelial degenerative changes. Petechial haemorrhage in the pyloric portion of the stomach, and small haemorrhages on the wall of the intestine, in the pleura, pericardium, and lung tissue.

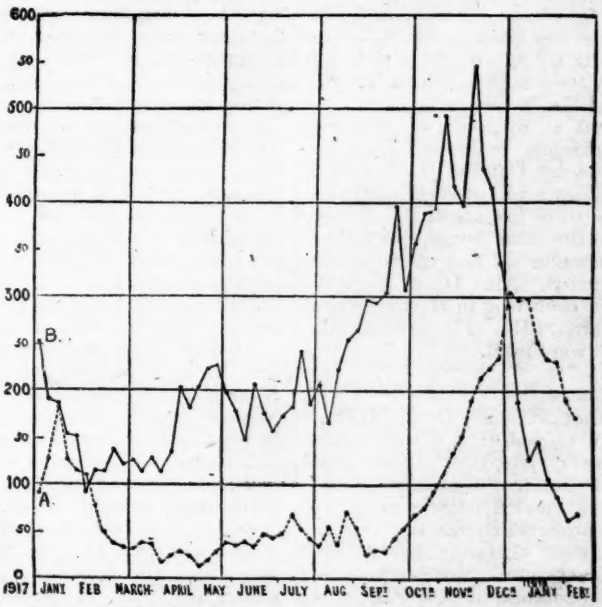
Major Gloster, I.M.S., made careful microscopical examinations and animal experiments for spirochaetes, with negative result.

CASE III.

Lieut. S., taken ill December 24th, 1917, with slight fever and the usual symptoms of epidemic catarrhal jaundice. On December 28th temperature normal, liver enlarged and tender, spleen palpable and slightly tender, tongue furred, constipated, definitely jaundiced, urine bile-stained, mental condition normal. Several attacks of vomiting without blood occurred during the next three days, but on January 2nd, 1918, the vomit contained streaks of blood and was bile-stained. Jaundice was now deep. He was very restless and maniacal during last night and this morning. On January 3rd the vomit was the same. Epistaxis in morning, liver dullness much diminished, being only 2 in. vertically; knee-jerks increased. Very restless and noisy. Next morning he became comatose, urine contained albumin, bile, and a few red corpuscles; no spirochaetes found in urine or blood. At 5 p.m., Cheyne-Stokes breathing, extensor plantar reflex; at 10 p.m. the temperature rose suddenly to 109°, and death occurred at 10.30 (Chart 5).

Post-mortem Examination (by Lieut.-Colonel Ledingham, R.A.M.C., and Major Gloster, I.M.S.).—Liver 39½ oz., stained yellow. Spleen enlarged and soft; kidneys yellowish. Small haemorrhages in pleura, pericardium, omentum, mesentery, and in lungs. The wall of stomach and duodenum contained petechiae, and their contents were blood-stained. The liver showed almost complete destruction of hepatic cells in blocks; only isolated islets of cells remained; in parts total necrosis of all but trabecular tissue. The kidney showed extensive degeneration of tubular cells; the pancreas, early but definite cell necrosis, with shrinkage and loss of outline of the cells that remained; in some places great reduction in number of cells.

Microscopical examination and animal experiments for spirochaetes of liver, kidney, and spleen were negative.



CURVE 2.—Showing incidence rate of epidemic jaundice and dysentery in Mesopotamia, 1917–18. A, Jaundice. B, Dysentery.

CASE IV.

I am indebted to Captain F. B. Ambler, I.M.S., for the clinical and *post-mortem* notes of this case.

An Indian was admitted to hospital on October 6th, 1917, with jaundice of the usual type; temperature remained normal until just before death. On October 10th he was constipated, the liver enlarged, tongue furred. Next day he had incontinence, was noisy and irritable, and vomited some blood-stained fluid; pulse 92; blood culture negative; became unconscious in the evening; knee-jerks now increased. Ankle clonus and extensor plantar reflexes present. On October 12th the jaundice was deeper; liver dullness very much diminished; coma continued. Temperature rose to 101° at 6 p.m., pulse 140. Death occurred at 7 p.m.

Post-mortem Examination.—Petechial haemorrhages in gall bladder, mesentery, and omentum. Spleen slightly enlarged. Liver very small; the surface on section was of dirty khaki colour, with small raised reddish patches like cirrhotic areas scattered through. Some larger reddish patches were also present.

From these accounts it will be seen that the terminal fatal symptoms in epidemic catarrhal jaundice are closely identical with those of delayed chloroform poisoning and of the other toxic liver poisons. The *post-mortem* signs also are exactly identical. Atrophy of the liver or extensive degeneration are the pathological results of either condition.

Etiology.

Epidemic catarrhal jaundice had its maximum incidence in Mesopotamia in December and January; in the Dardanelles in October. In both areas there was a close association with the incidence of "dysentery"—that is, enterocolitis affections. Thus the charts for the two diseases in both areas indicate that the jaundice curve attained its maximum about three weeks after that of dysentery. (See Curves 1 and 2.)

There must be an etiological association between the two diseases—for example, food or water infection—and it is likely that the entero colitis resulting from a "dysenteric" affection in some cases prepared the way for the infection causing epidemic catarrhal jaundice. This view is borne out by the symptomatology of the disease, for, as we have seen, there was commonly a previous history of diarrhoea or dysentery in the jaundice cases, and also it was not uncommon for jaundice to develop in patients actually suffering from dysentery in hospital.

The epidemic character of the disease is beyond doubt, and in the Dardanelles and in Mesopotomia there were numerous instances of a large percentage of cases occurring in one unit. The danger of infection from person to person does not seem to be greater than in enteric fever, for instances of infection from patient to patient in hospital were not common. The epidemic character appeared to be due to a common cause rather than a spread from person to person. No evidence of air-borne infection was obtained from the study of the disease in the Dardanelles and in Mesopotamia.

The association of the curves for epidemic catarrhal jaundice with those for dysentery, diarrhoea diseases, and enteric group infections, indicate an intestinal origin for the infection.

In Mesopotamia jaundice was wisely made a notifiable disease, and records have been kept for 1917 and 1918. In 1917 there were 1,538 cases with 0.6 per cent. deaths in British troops, while in Indian troops there were 2,634 cases with 0.3 per cent. deaths, the gross mortality being 0.41 per cent. These low mortality figures are in striking contrast to the similar figures from spirochaetosis icterohaemorrhagica, or the so-called Weil's disease.

It is interesting to note that an epidemic of jaundice closely identical with the epidemic catarrhal jaundice above described was reported[7] by Captain G. C. Gray, R.A.M.C. In the Cambridgeshire area between April and November, 1917, seventy cases were investigated. In one instance four cases occurred in the same house, in another three, and there were four instances of two cases in the same house. No deaths occurred. Also Dr. S. Harthill described[8] a similar epidemic occurring in Hertfordshire between October, 1917, and March, 1918. He gives details of fifteen cases, none of which were fatal.

Bacteriology.

In the Dardanelles cases Lieut.-Colonel C. J. Martin, Major Archibald, and Captain Campbell, R.A.M.C., made numerous blood cultures in cases of jaundice. In no case of clinical "epidemic catarrhal jaundice" was any specific organism found. Several cases yielded enteric or paratyphoid organisms, but these subsequently ran the typical clinical course of these diseases. Examinations of the faeces and urine gave no definite results. Similar investigations were carried out in Mesopotamia by Major Mackie, I.M.S., Major Gloster, I.M.S., and others, with like result.

Martin and Hurst investigated some of the Dardanelles cases by withdrawing fluid from the duodenum with Einhorn's evacuator, but no definite results were obtained.

In six out of eight cases of jaundice a bacillus of the *faecalis alkaligenes* group was obtained, but this organism was obtained also in three out of four from healthy patients. Some of the cases showed other bacilli and cocci in scanty numbers.

In the Dardanelles Sarrailhé and Clunet[9] found on blood culture organisms of the paratyphoid group in the jaundice cases. In some of these paratyphoid B was found; later they found an organism which did not give the agglutination reactions for paratyphoid A or B, and which they named paratyphoid D. These observations have not been confirmed by our bacteriologists.

In the Dardanelles Martin made numerous examinations for spirochaetes with negative result, but was unable to carry out animal experiments as guinea-pigs were not available.

In Mesopotamia the most careful observations on cases of epidemic catarrhal jaundice in all stages of the illness were made by Lieut.-Colonel Ledingham, R.A.M.C., Consulting Bacteriologist to the Force, Major Mackie, I.M.S., Major Stevenson, I.M.S., and Captain Shortt, I.M.S.

The blood was examined in the early stages, and the urine also in the later stages. Liver punctures were made during life, and the organs were examined *post mortem*. In no case was the *Spirochaeta icterohaemorrhagiae* found, though guinea-pig experiments were freely made in addition to the other methods of investigation. In two cases during life Mackie found organisms of the *B. coli communis* type—in one from liver puncture, in the other from a catheter specimen of urine. In fatal cases organisms of *B. coli communis* type were frequently found in the liver, but may have been *post-mortem* contaminations.

It has been conclusively proved that in the epidemic catarrhal jaundice of Mesopotamia the disease was not caused by a spirochaetal infection, and the exact similarity of the Dardanelles cases to those in Mesopotamia justifies the same conclusion for them.

Neither in the Dardanelles nor in Mesopotamia was there any association whatever between occurrence of the disease and the presence of rats. Indeed, in Mesopotamia numerous cases of jaundice occurred in camps in the desert where no rats existed for miles around. Major Mackie collected with some difficulty a number of rats from towns in Mesopotamia, and conducted careful guinea-pig experiments with them, but in no case did he find any evidence of a spirochaetal infection.

A specific organism causing "epidemic catarrhal jaundice" has not yet been found. The symptoms and etiology point to an infection by the intestinal tract, and there is, no doubt, a general blood infection the duration of which is probably very short.

It is not surprising that blood culture examinations have been negative, because, as has been pointed out, when jaundice develops—that is, the earliest time at which a diagnosis can be made—the temperature is either declining or has fallen to normal, and a blood culture examination would be expected to prove negative. In enteric it is well known that positive results from blood culture are usually yielded only in the early period (first eight days or so) of the pyrexia, so that in these cases of jaundice with a short pyrexial period it is probable that blood cultures have been taken too late for a positive result. So few cases prove fatal that opportunities of *post-mortem* examinations are rare, and in the few cases in which death occurs it is usually at such a late period of the illness that bacteriological examinations are rendered difficult by death agony and *post-mortem* contaminations.

I believe that epidemic catarrhal jaundice is probably due to an intestinal infection causing duodenitis and a catarrh of the bile ducts. The area around the ampulla may be mainly affected, and in some cases there may be produced an ascending catarrh causing cholangitis. In either case obstructive jaundice may result.

The above train of events is no doubt associated with a transient general blood infection, of which the causal organism has yet to be proved. It is possible that, in some cases at any rate, the catarrhal condition of the duodenum and bile ducts may be caused by organisms which are found in health in the intestinal tract, of the type of *B. coli communis* or *B. faecalis alkaligenes*.

It is well known that a common "cold in the head" or "nasal catarrh" may be caused in an individual by organisms which are found in his nasal passages in conditions of health. Thus one of the organisms present—for example, the pneumococcus or the influenza bacillus—may become for a time pathogenic and set up nasal catarrh and cause nasal obstruction. It is quite possible that a similar condition of things may occur in epidemic catarrhal jaundice.

Epidemic catarrhal jaundice as above described is not a new disease. It has probably occurred in most campaigns.

Thus in the American war 22,509 cases of jaundice occurred with 161 deaths, and in the South African war 5,648 cases with a small mortality. It is probable that these cases were mainly of the epidemic catarrhal type.

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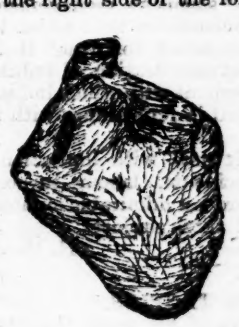
Memoranda:

MEDICAL, SURGICAL, OBSTETRICAL.

TRAUMATIC RUPTURE OF THE HEART WITHOUT FRACTURE OR EXTERNAL LESIONS.

A GURKHA rifleman, aged 19, previous chest measurements 32 to 34, height 5 ft. 1 in., was brought in dead to hospital on account of the following accident: Whilst engaged in fire practice in the regimental lines he was pulling the wheeled fire pump when, coming downhill, it ran away with him, and he was crushed between a stone wall and the cross-bar handle of the pulling shaft, which apparently caught him across the middle of the chest. He was seen to fall dead at once.

Post-mortem Examination.—Externally there was some congestion of the right eye, and a small cut and contusion on the right side of the forehead. No other contusions or lesions were found anywhere and no fractures or haemorrhages, though the saliva was tinged with blood, possibly from some undiscovered cut in the mouth. The base of the skull was not fractured; there was marked pachymeningitis along the superior longitudinal sinus. The abdomen was natural; the ribs were unfractured, but were very pliable, so that the chest could be easily compressed. The lungs were natural. The pericardium was full of blood but undamaged.



The heart was very small, being only about 3½ in. long and 3 in. broad. No scales were available at the time for weighing. The valves and heart muscle were apparently natural, and there was no trace of aneurysm or old disease. In the wall of the right auricle, between the right coronary artery and the entry of the inferior vena cava, was a small rent measuring about ¾ by ½ in., as shown in the diagram.

The only explanation I can offer of this curious accident is that at the moment of impact the man may have taken a deep inspiration, engorging the right auricle, which then burst on sudden compression through the costal wall by the cross-bar of the shaft of the fire pump.

A. C. L. BILDERBECK,
Captain I.M.S.

INTRAUTERINE CRYING.

A FEW days since I was called to attend a case of labour in a multipara. Progress was slow, and I injected pituitary extract twice—1 c.cm. doses two hours apart. I then dilated the os as fully as possible, and as the head still remained above the outlet of the brim I decided to use forceps.

Having punctured the membranes the fluid escaped freely, and a short time afterwards I was surprised to hear muffled but unmistakable crying. The patient being uncovered and already prepared and under chloroform, I applied forceps, but the head being high and moving freely the blades slipped off. During the interval before the forceps were reapplied the crying was again heard quite clearly, and was remarked upon by the husband and nurse.

It was about six minutes from this time that the head was finally delivered, the blades having been previously removed to prevent laceration. The cord encircled the neck twice. The child—a girl—gasped, was easily resuscitated, and cried lustily. Later considerable fluid was removed from the air passages. The child did well.

Ponoka, Alberta, Canada. MELVIN GRAHAM, M.B.

Reports of Societies.

THE BACTERIOLOGY OF PYORRHOEA.

AT the meeting of the Section of Odontology of the Royal Society of Medicine on May 26th Mr. J. G. TURNER, F.R.C.S., and Mr. A. H. DREW, D.Sc., gave an account of an experimental inquiry into the bacteriology of pyorrhoea. It was described as a continuation of a previous communication on the general microbiology of pyorrhoea, and the further results were now reported because Dr. Drew was about to resume his duties as bacteriologist to the tuberculin department of the Federal Serum Institute, Melbourne. The methods by which the microscopical preparations were made during the present research were fully described, and the results were stated under the following headings:

1. *Living Pulp.*—The living pulp appeared to become readily infected, and such infection was not necessarily associated with caries in the ordinary acceptation of that term. A preparation from the pulp of a bicuspid was demonstrated, showing a diphtheroid infection; in this case there was associated chronic pyorrhoea, but it was thought improbable that it was concerned in the pulp infection. In another case infection by two distinct types of diphtheroids was demonstrated, in others mixed infections by diphtheroids, streptococci, and at times staphylococci, and spirochaetes. Mixed infections were always associated with caries to a greater or less extent, and in at least one instance the vessels of the pulp were found to contain organisms (diphtheroids and cocci).

2. *Dentinal Tubules.*—It was certain that the dentinal tubules were frequently infected from the pulp cavity. While probably any organisms in the mouth could infect pulp, those most usually associated with dentinal infections seemed to be comparatively few in number—namely, diphtheroids, cocci, and spirochaetes.

3. *Cementum.*—Infection of the cementum was frequent, and three routes could be distinguished—(*a*) from the pulp cavity and tubules; (*b*) through the periodontal membrane; and (*c*) from surface caries. There was evidence that cementum could be infected from a living but infected periodontal membrane. No section showing actual invasion of the cementum by bacteria from the dentinal tubules had been obtained, but one showed its near approach. Another showed surface caries of the cementum, with a thick growth of bacteria on the surrounding cement surface. This layer of bacteria was always found on the denuded roots in pyorrhoeal pockets, and explained the difficulty of treating pyorrhoea without thorough cleaning of all such denuded roots.

4. *Gums.*—In chronic cases bacteria were invariably present in the gums; the most frequent were diphtheroids, streptococci, and staphylococci. In one instance a heavy infection with a sporing bacillus was observed; the gum showed chronic fibrous thickening; there was no pocketing by destruction of the alveolar dental membrane but only by swelling of the gum, nor was there any ulceration; apparently the bacteria gained entrance through a merely inflamed surface. A section from the gum flap overlying an erupting wisdom tooth in a man of 48 showed dental sepsis at its earliest moment—namely, just as the gum uncovered the tooth and left the crypts open to infection. Here a pure diphtheroid infection was to be seen running up the lymphatics.

5. *Granulomata.*—Sections of granulomata from the apices of teeth invariably showed the presence of micro-organisms.

6. *Bone.*—Sections through the jaws with teeth *in situ* from cases of advanced pyorrhoea showed heavy infections of the bone, a striking fact being the presence of organisms within the Haversian systems. In several such cases the same organisms (diphtheroids and cocci) were demonstrated in the stomach wall, but the total number of cases examined was not yet large enough to allow it to be stated that the condition was invariably present.

The authors held that the result of their investigation was to establish the immense importance of the mouth as a potential source of disease, but as the research was incomplete they did not presume to draw definite conclusions. They called attention to the striking fact that in all chronic cases any indication of phagocytosis was absent.

Reviews.

INDUSTRIAL PHYSIOLOGY.

IN his book on *The Human Machine and Industrial Efficiency*,[1] Professor F. S. LEE publishes the substance of two lectures recently delivered at the Harvard Medical School on "Industrial efficiency and the war." Professor Lee is well known in this country for his investigations into the physiology of fatigue, and he is likewise the chairman of the subcommittee on fatigue in industrial pursuits of the National Research Council, which has been making inquiries into the conditions of labour in certain of the munition factories on behalf of the public health service of the United States. He is therefore exceptionally qualified to instruct us on the subject of industrial fatigue and the methods of avoiding it. His book does not attempt much detail; it is a brief summary of available information, put together in a very readable form, and if only the managers of all industrial concerns in this country could be induced to read it, and mentally digest its contents, they could not fail to acquire information and guidance of the utmost value to them in the treatment of their employees.

Professor Lee's main thesis is best indicated by the parallel which he draws between industrialism and medicine. He points out that in both subjects there is a conflict between the old and the new—between empiricism and tradition on the one side and science on the other. In the study of medicine science has been rapidly coming to the fore, owing to the development of the experimental method, but industrialism is far behind in this respect. Still, it is becoming increasingly clear that in all that pertains to the efficiency of the worker the physiological point of view is the only correct one, and that industry must be organized on a physiological basis before the highest degree of efficiency can be secured. A science of industrial physiology must come into being—a science of the human machine in industry—and this science must be largely developed in the factories and workshops themselves. They must constitute the laboratories in which much of the observation and experiment of the future must be made, though supplementary investigations will have to be carried out in our regular physiological laboratories.

In seventeen brief chapters Professor Lee indicates the various directions which, in the light of recent research, lead towards increased efficiency and productivity and diminished fatigue. He points out, first, that the qualifications of workers should be determined so far as possible by exact tests, and workers should be assigned to tasks in accordance with their qualifications. He describes recent investigations, by a spring balance test, of the muscular strength of various groups of munition workers, and shows that the average industrial woman has less than half the physical strength of the average industrial man. The women employed on the heaviest job investigated averaged only two-thirds the physical strength of the men employed on their (the men's) lightest job. In other words, women are very seldom adapted to the types of work usually assigned to men, though in certain other qualities, such as delicacy of the senses, they excel them. The spring-balance test was likewise used for investigating fatigue, and it showed that workers engaged in the more strenuous operations suffered some diminution of strength at the end of the day's labour, though in operations requiring moderate exertion only the weaker workers showed an effect.

Other methods for investigating the onset of fatigue are described, but the only one of practical value at present available is the determination of output. Measurements of hourly output usually show that during the first hour or two of work there is an increase of output which is usually considered a "practice-effect," or increase of working power due to better neuro-muscular co-ordination. This is followed by a declining output, the result of fatigue. Very striking evidence of such fatigue was obtained by Professor Lee in certain of the night workers at a munition factory. The men, who were drilling a hole in fuses, worked continuously for 5¾ hours, and then, after a twenty minutes interval, for 6¼ hours. Their output kept up well until the last two hours, when it fell gradually almost to zero. This was due largely to the workers being so fatigued that they had to knock off work altogether, and in fact at one time a fifth of them were found to be actually asleep. There can be very little doubt that if the working hours of these men had been reduced by at least two per shift, and their meal interval had been increased to an hour, their total output would have been increased rather than diminished, and much unnecessary fatigue have been avoided.

The length of the working day is discussed in some detail, though the discussion is confined to the limits of twelve and eight hours. The statistical evidence adduced is all in favour of the shorter hours as against the longer, and points to the eight-hour working day as offering the best condition for high productivity, but Professor Lee is careful to indicate that the facts at present available do not justify the conclusion that an eight-hour day is advisable universally in the industrial world. It is a scientific question to be decided only by prolonged observation and experiment. It is bound up with other matters, such as the determination of the most suitable length of work spells and of rest periods.

The much-debated subject of "scientific management" is discussed, and Professor Lee concludes that whilst this principle is to be highly commended for what it has accomplished in organizing the administration of industry and improving the material equipment with which industry works, it falls far short of an ideal in its dealings with the human machine.

Other chapters in the book deal with limitation of output, overtime, industrial accidents, labour turnover, food, and welfare work, and afford an admirable summary of our present-day knowledge of these subjects.

H. M. V.

[1] *The Human Machine and Industrial Efficiency.* By Frederick S. Lee, Ph.D., LL.D., Dalton Professor of Physiology in Columbia University, etc. London: Longmans, Green and Co. 1918. (Cr. 8vo, pp. vii + 119; 14 figures. 5s. net.)

FEVERS IN THE TROPICS.

IN the preface to the third edition of his work, *Fevers in the Tropics*,[2] Sir LEONARD ROGERS states that the section on kala-azar has been largely rewritten, and that nearly every section has been extensively revised, and most of them arranged so as to give the history, geographical distribution, etiology, and prophylaxis before the clinical section. Special attention has been devoted to the treatment of those diseases for which drugs, believed with more or less justification to be specific, are available, including kala-azar, trypanosomiasis, malaria, and amoebic hepatitis. Recent work on typhus has been included, and there are short articles on Oroya fever, on infective jaundice, and on "trench fever," regarding which important advances have recently been made. The historical introduction and the article on epidemic dropsy, which is now generally considered to be beri-beri, have been omitted, and the section on blood examination has been reduced and distributed under the appropriate sections, because the author believes that the improved teaching of tropical medicine has rendered a separate section no longer necessary. The section on liver abscess has also been omitted, as it has appeared in the author's book on dysenteries, where it finds a more appropriate place.

The great value of the book is due to the fact that it is

[2] *Fevers in the Tropics.* By Sir Leonard Rogers, Kt., C.B.E., M.D., F.R.C.P., F.R.C.S., F.R.S., Lieut.-Colonel I.M.S. Third edition. London: Henry Frowde, and Hodder and Stoughton. 1919. (Cr. 4to, pp. xii + 404; illustrated. 30s. net.)

largely a record of Sir Leonard Rogers's own work. As was to be expected, kala-azar is very thoroughly treated and due stress is laid upon the value of intravenous injections of tartarated antimony in the disease; a summary of the history of the introduction of this drug by the intravenous route is given. Credit is rightly assigned to Broden and Rodhain, who got over the great difficulty caused by the extremely irritant effect of the salt on the tissues by giving it by the intravenous method. The results obtained by Rogers and others are excellent and appear to justify the application of the term specific curative to the salt. The author expresses the opinion that the soluble potassium and sodium antimonyl tartrates should be given a more extensive trial in trypanosomiasis, but they have as a matter of fact been used extensively, especially in Europeans suffering from that disease; in many instances beneficial effects have not been noticeable and death has not been averted. Most of the Rhodesian cases that have come to England have had this drug, and yet all but one have died. As a warning to those who may consult the book for references on kala-azar and trypanosomiasis, we think it well to say that the lists are defective, owing, perhaps, to omission from the library in which the author has worked. We note also, in the section on amoebic hepatitis, the absence of any remarks on the large amount of work done in dysentery and amoebic disorders generally with the new drug emetine bismuth iodide. The reports of the Medical Research Committee on the subject should be consulted. It is extraordinary how long fallacies and erroneous statements survive, once they have passed into the literature of the subject. For example, Seidelin's bodies still find a place in the chapter on yellow fever, though Wenyon and Low sounded their death-knell as long ago as 1914. Noguchi's latest work on the finding of spirochaetes was published too late for inclusion, but if confirmed it will prove to be very important. The new chapters on trench fever and infectious jaundice, founded on the literature existing at the present time, are good and carefully put together. The name of the spirochaete is *S. icterohaemorrhagiae*, not *icterohaemorrhagica*, by the way. A perusal of the different articles will well repay practitioners of tropical medicine, who will find much to interest them in its pages, and will derive much advantage from coming into contact with the thoughts and methods of so accomplished an investigator as Sir Leonard Rogers.

REVOLUTION BY SYMBIOSIS.

IN *Les Symbiotes*[3] Professor PORTIER puts forward some rather revolutionary ideas in physiology. All living things, plants and animals, are, he maintains, constituted by the association of two different beings. The mitochondrial filaments and granules found in all cells are, according to him, symbiotic bacteria or "symbiotes." The symbiote has two remarkable properties—first, an extreme plasticity which allows an adaptation to very varied conditions, and, secondly, very extensive powers of synthesis, which vary according to the conditions in which it is placed. Bacteria are the only simple beings, all other living things are an association of two. The symbiote comes from without and in certain cases it may be cultivated in external media. As it has become adapted to a living cellular medium it is difficult to accustom it to the ordinary laboratory culture media, at least as far as the higher vertebrates are concerned, but the cultivation is comparatively easy in certain insects. As his whole thesis rests on the cultivability of mitochondrial bodies his bacteriological method must be beyond reproach, and though he is at pains to state his methods fully, yet a sceptic would be more convinced by an ocular demonstration than by the most detailed account of the method.

Certain burrowing larvae of micro-lepidoptera having perforated the cuticle of leaves live in the parenchyma in an absolutely aseptic condition, and their alimentary tube contains neither unbroken cell masses nor bacteria, but when the metamorphosis comes the insect adopts other means of nutrition, and its alimentary canal is full of bacteria and unbroken cell masses. The conclusion is drawn that the bacteria assist in rendering soluble substances refractory to the action of the digestive juices. Again, in xylophagous larvae the pabulum is quite refractory to digestion, but the bacteria found in them can live on this, and it is the bacteria that are the food of the larvae. The micro-organisms penetrate the cells of the canal, some undergo intracellular digestion and form the food for the cells of the different organs; others are found in the blood; and others, again, in the various cells of the body; but the striking fact is that most of these bacteria are found in the fatty tissue annexed to the genital organs. In such a situation these cultivable symbiotes are to be observed in the whole series of vertebrates up to and including mammals. In the higher vertebrates his cultures prove fertile when made from testicle, ovary and pancreas, especially when the particular organ has undergone a period of intense physiological activity. The organisms obtained have remarkable biological properties: they can be educated to resist dry heat even at 140° C.; they can be dehydrated and heated to 120° C. in sealed tubes of acetone and still be capable of subcultivation; they will resist 1 in 20 carbolic acid for fifty hours, and so on. They are pleomorphous, but can be obtained in coccal or bacterial form according to the medium in which they are grown. They can analyse most complex bodies or synthetize simple substances according to the conditions under which they are put to work.

Portier considers that all mitochondrial bodies, blood platelets, and the bacteria of root nodules of leguminosae belong to the same class of living beings. They constitute the apparatus of elaboration. In metabolism they take the undifferentiated rough products of alimentary digestion, and within each cell elaborate them into the products the cell requires. They allow also of the fecundation and division of cells. By their action, or want of action, may, he thinks, be explained such widely different problems as parthenogenesis, beri-beri, and cancer. Of course, it all turns on the question of the identity of mitochondrial bodies and the resistant sporing bacteria that he finds in his culture tubes. According to the reader's temperament the book will render him anxious to pursue the same experimental investigations or will leave him quite cold.

[3] *Les Symbiotes.* By Paul Portier, Maître de Conférences à la Faculté des Sciences de Paris, etc. Paris: Masson et Cie. 1918. (Cr. 8vo, pp. xx + 315; 63 figures, 1 plate. Fr. 5 + 10 per cent.)

NOTES ON BOOKS.

DR. RUSK has studied the observations of the best educationists, and has based upon them his system of teaching. In his book on *Experimental Education*[4] he starts with the physical and mental development of children, and although the power of apprehension and discrimination of colours exists already in infants, he defers his lessons till a later period, when there is evidence of the mental growth of children. That growth, as in the physical state of children, differs according to ages and proceeds in fluctuating periods. With some it is very rapid, then it becomes slower, and there may be even regression. The rate of growth is dependent on innate dispositions, and is as a rule greater in girls than in boys. The nearer the individual approaches to maturity, the more perfect is the mental capacity. Dr. Rusk has studied also the best time and means for learning. The best periods for teaching and learning approximately coincide. The state of the general health is an important factor in both these processes. Dr. Rusk has laid down certain rules which in his opinion facilitate the mastery of school subjects.

[4] *Experimental Education.* By Dr. Robert Rusk. London: Longmans, Green, and Co. 1919. (Post 8vo, pp. 346. 7s. 6d. net.)

PORTRAIT OF SIR CLIFFORD ALLBUTT.

As announced a few weeks ago, Sir Clifford Allbutt has accepted an invitation to allow the profession to present to him a portrait of himself painted by an eminent artist. The Council of the British Medical Association has taken the initiative in the matter because Sir Clifford Allbutt has been President of the Association during the years of the war, and will preside over its Annual Meeting in Cambridge next year. The esteem due to Sir Clifford Allbutt's attainments and the warm affection inspired by his character are such that very many, both within and without the Association, will desire to share in this tribute to one whose career has reflected so much honour on medicine in England. This desire will not be limited to his many pupils, first in Leeds and afterwards in Cambridge, nor to the members of the

Association, and subscriptions are invited from all members of the profession. The amount is limited to one guinea, and the Treasurer of the British Medical Association, 429, Strand, London, W.C.2, is prepared to receive subscriptions of one guinea or less.

The first list of subscribers was published in our issue of last week. The following further subscriptions have been received down to Monday evening:

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CORRECTIONS.—The following names were incorrectly printed in the list of subscriptions published last week: Dr. Peter H. Abercrombie (London), Dr. Denis A. Sheahan (Portsmouth), Dr. Graham Steell (Manchester).

British Medical Journal.

SATURDAY, MAY 31ST, 1919.

SCIENCE AND THE STATE.

PROFESSOR KARL PEARSON has done well to reprint an introductory article from a volume of the *Encyclopaedia Britannica* (tenth edition) and a lecture delivered in Newcastle eighteen years ago,[1] for these writings contain the message which he delivered to his fellow citizens at the end of the Boer war, the inferences he drew from statistical researches into heredity already executed at that time, his forebodings of evil and his proposals for averting it. To consider how far the accumulations of sixteen years' research and the experience of a greater struggle than that in South Africa confirm or modify his diagnosis, prognosis, and suggested treatment will not be without instruction.

Professor Pearson maintained in 1900 that both physical and intellectual characters of man were inherited, that the fertilities of different stocks were affected by voluntary restriction to different degrees, and that on the average the less worthy members of society alone contributed without reserve to the increase of population. Each of these propositions has been confirmed by subsequent inquiry. Current views as to the mechanism of heredity differ from those of 1900, the method of selecting breeding stock in plants and animals other than man has been affected by recent research; but, so far as human qualities are concerned, nothing has occurred to diminish the value of the statistical conceptions which we owe to Sir Francis Galton and Professor Pearson. The differential fertilities of various stocks, the extreme limitation of fertility amongst those middle class stocks (such as the families of women graduates and most members of the educated classes) which have for long contributed the bulk of our national leaders, has been demonstrated by such data as those of the census of fertility in 1911, the results of which, so far as Scotland is concerned, were published before the war, or the material submitted to the unofficial commission on the birth-rate which reported a few years ago. It is probably true that the birth-rate of all classes has declined, but the class differentiation still exists.

Upon the basis of these propositions, which have since been fully established, Professor Pearson urged that it was important to organize the nation upon a scientific basis, that encouragement should be given to the fitter stocks to multiply, that both general and technical education should be devoted to training the natural powers of observation and reasoning and become more an instrument of drawing out what was best in the pupil and less an affair of cramming him with extrinsic knowledge. For the encouragement of the fit stocks something has been done in the shape of a more enlightened administration of the scholarship system and by a small relief of parenthood in the income-tax-paying classes; but the contribution of the State in these directions has been modest indeed. The able man who devoted himself to pure science or any form of literature other than the production of popular novels and plays during the last sixteen years received scant encouragement to be fruitful and multiply.

The general defects of our educational system, so far at least as the profession of medicine is concerned, the steady multiplication of subjects to be "got up," the steady diminution of the possibility of acquiring a general view of any subject owing to its entanglement in a thicket of details—these are displayed in Sir George Newman's *Memorandum*. The two portraits in *Hamlet* hardly differ more than the picture of a medical man as Sir George Newman (and all other intelligent men) wishes to see him and the type which the present curriculum tends to produce. Sir Clifford Allbutt's recent remarks upon this point express the opinion of the most experienced and sagacious teacher of medicine in this country, and agree with Professor Pearson's diagnosis in 1900.

Professor Pearson warned the nation—his audience in 1900—that a greater crisis than that then endured might again find us ill fitted to meet it; in the preface to his new edition he observes: "When Armageddon was upon us ignorance in authority had no better use for trained minds than to send them to handle cannon with uncomputed range tables, to fire guns without sights, to man-carry rations where it should have run a light railway, or to speak over single-wire field telephones because it knew nothing of induction. When the history of the present war is really written one of the most curious chapters will be the marvellous manner in which in almost every field the scientific layman has come to the aid of executive ignorance."

Professor Pearson asks whether we are "to return to the old order of things now the war is over, or shall science continue to exercise its proper function in the state in the harder contests of the coming peace?" That in medicine there *can* be no return to the position of 1914 is evident; economic conditions alone would preclude this. Whether a better system will be evolved depends upon the fulfilment of many conditions, and this is certainly not guaranteed. The recent incident of the professional committees is a straw which shows that we are not sheltered from winds of ignorance which may become tempests.

Men of science have often complained, with reason, that the public press and politicians ignored their doings; but King Stork might not be a good successor to King Log. We find in the columns of the press and in the speeches of politicians unlimited expressions of confidence in the conquests of disease which are to be made by State-endowed research, investigation and organized campaigns; we do not find any enthusiasm for the laborious process of so reconstructing our social life that in medicine, as in other fields of human endeavour, education shall perform the duty which Professor Pearson justly assigns to it—that of drawing out and rendering serviceable to mankind the best intellectual qualities of our youth. Yet upon doing this depends the best, nay, the only hope of the future. The submergence of the ancient civilizations has been thought to be due to the concentration of educated ability within a narrow caste; the collapse of our highly organized and technically efficient foe was hastened by the same fault. Any state system which encourages the withdrawal of the best men from contact, in technical school and university, with the rising generation has the seed of death in it. Those now entrusted with the state control of medical research are we believe fully alive to this fact, but they will need the steady support of the profession as a whole if the just claims of medical education are to be wisely met. A politician who could say that he had secured the whole-time services of a dozen men with popular reputations

[1] *National Life from the Standpoint of Science* and *The Function of Science in the Modern State*. Cambridge: University Press. 1919. (Cr. 8vo, pp. 106 and 97. (1s. 6d. and 2s. net.)

to wage war against cancer would be far more secure of newspaper support than if he devoted the same sum of money to the provision of university scholarships for young biochemists: yet the second course might be much more conducive to ultimate success than the first.

PROPHYLACTIC VACCINATION AGAINST PNEUMONIA.

IN America, where vital statistics show that more persons die from pneumonia than from any other infection and that the rate is slowly increasing every year, the disease has naturally been the subject of very active investigation. In 1913 Douchez and Gillespie by serological methods established the now well known four types, I, II, III, and IV, of pneumococci, of which the first three are spoken of as fixed, though there are atypical forms of type II. As a practical outcome of this work a curative antipneumococcic serum against pneumonia due to pneumococcus type I has been successfully employed,[1] but the immune serums homologous for the other types of pneumococcus have not proved effective. Somewhat different and more numerous types of pneumococci were soon after described in South Africa by F. S. Lister, whose work, probably because it appeared in a not very accessible publication, has perhaps been rather overlooked. In addition he elaborated the prophylactic vaccination against pneumococcic infection among the native workers in the Rand mines, originated by Sir A. E. Wright before the various types of pneumococci were recognized. The good results obtained by Lister from prophylactic inoculation with a vaccine of the three types responsible for 69 per cent. of the cases of pneumonia among the Transvaal natives were referred to in this JOURNAL more than a year ago.[2]

More recently prophylactic vaccination against pneumonia has been extensively adopted in the army camps in America, and as a majority of the cases of pneumonia in civil life there are of the primary lobar type, which is the form most amenable to prophylactic inoculation, it is probable that there is a wide scope of usefulness before this means of prevention. Early in 1918 Cecil and Austin[3] published the results of the prophylactic vaccination of 12,519 men at Camp Upton with pneumococcic types I, II, III. No cases of pneumonia due to these fixed types occurred among the vaccinated men, and the incidence of pneumonia due to pneumococcus type IV and of streptococcus pneumonia was much less in the vaccinated than in the unvaccinated troops. There were, however, two minor drawbacks about the process of vaccination. The first was the necessity, in order to obtain satisfactory protection, of giving three injections to men who had already received the triple vaccine against enteric fever, and ordinary vaccination against smallpox. The second drawback was the occasional appearance of small sterile fluctuating infiltrations at the site of injection, which appeared to be an expression of cutaneous hypersusceptibility. In a report of a special commission appointed by the Surgeon-General to investigate the value of pneumonia vaccine at Camp Wheeler in Georgia, Cecil and Vaughan[4] point out that these objections can both be obviated by the use of a lipo-vaccine, or an oily, instead of a saline medium of suspension of pneumococci, on the lines of the antityphoid lipo-vaccine initiated by Le Moignic in France and subsequently adopted in the United States army. As the oily emulsion is absorbed more slowly than the saline, it is possible to give a single large dose without any fear of reactions. Eventually Whitmore, who applied this principle to numerous vaccines, including the pneumococcic, employed cotton-seed oil with 2 per cent. lanolin as less irritating than olive oil to the subcutaneous tissues, and showed that protective bodies do not begin to appear in the blood until the eighth day after vaccination. The dose of the lipo-vaccine is 1 c.cm.; this quantity contains 10 billions each of pneumococci, types I, II, and III. This pneumococcic lipo-vaccine was given to 13,460 men, or 80 per cent. of the strength, at Camp Wheeler in the autumn of 1918. Only 104 men, or 0.7 per cent., had a constitutional reaction necessitating admission to hospital, and 68 per cent. of these were negroes, who seem more susceptible to the pneumococcic toxin, though they only numbered 22 per cent. of the vaccinated. The local fluctuating infiltration at the site of injection was noted in 5 cases only, thus contrasting with its incidence in 152 cases at Camp Upton, where the saline suspension was employed.

The test of this pneumococcic lipo-vaccine turned out to be much more severe at Camp Wheeler than at Camp Upton, for not only were many of the troops raw recruits and negroes, instead of well seasoned soldiers, but an outbreak of influenza commenced about nine days after the administration of the protective pneumococcic vaccine was begun. For this reason 2,226 recruits received in addition an injection of influenza vaccine (1 billion influenza bacilli). The results of pneumococcic vaccination, though not so striking as those at Camp Upton, were sufficiently encouraging to justify its further application in civil as well as in military life; and there was not any evidence that pneumococcic vaccination disposes the individual even temporarily to either pneumococcic or streptococcic pneumonia.

[1] See BRITISH MEDICAL JOURNAL, 1918, i, 58, 61.
[2] BRITISH MEDICAL JOURNAL, 1918, i, 351.
[3] R. L. Cecil and J. H. Austin: *Journ. Exper. Med.*, Baltimore, 1918, xxviii, 19.
[4] R. L. Cecil and H. F. Vaughan: Ibid., 1919, xxix, 457.

THE MINISTRY OF HEALTH AND THE MEDICAL PROFESSION.

CERTAIN statements have appeared in the press during the last few days to the effect that the President of the Local Government Board proposed to introduce a medical services bill during the present session. It is obvious from the wording of the paragraphs that the writers laboured under some confusion in their endeavour to piece together the public statements of the Government with regard to the reform of the Poor Law and some oddments of "lobby" gossip. On this point our Lobby correspondent writes: "It will be seen from the answer (p. 683) Dr. Addison gave to a question in the House of Commons on May 28th by Dr. A. C. Farquharson, that the rather nebulous statements made in the press paragraphs were founded on misapprehension. It was to be anticipated that the Minister, as soon as the Consultative Council upon medical and ancillary services was set up under the Ministry of Health Bill, would refer to this body questions in respect of the development of local health services, but he does not intend to submit to the Government any proposals until he has had the advice of the Council. The assumption may be made that while the value of a small advisory council for the preparation of a bill can hardly be over-estimated, the Government and the Council will welcome the discussions which are about to take place at a large number of centres as affording an indication of the desires of the profession. It may be added that lobby gossip suggested widely different Government proposals—such, for instance,

as an improvement in the position of panel doctors, and State aid for hospitals, with a limited measure of State control. But neither of these matters has actually been considered by Dr. Addison at present." We may recall the announcement made in the JOURNAL of May 17th with regard to the Group Conferences which have been arranged by the Insurance Acts Committee in conjunction with the Local Medical and Panel Committees. We understand that a series of eighteen such conferences are being arranged throughout England and Wales to discuss the reports recently issued to every member of the profession concerning changes which may be expected to occur in the National Insurance agreements for next year and the suggestions for developments of medical services. At these conferences a representative of the Insurance Acts Committee will be present to introduce the reports, and representatives of the Commissioners will be present to assist in the elucidation of any points which may arise in the discussion. We hope to be able to publish reports of these meetings shortly, but meanwhile we may point out that, however valuable the Minister may find the advice of a small advisory council in the preparation of a bill, it cannot, as an indication of the desires of the profession, take the place of the results of the discussions at a large number of centres which every member of the profession has been invited to attend.

THE DOGS' BILL.

A FULL report of the discussion in the House of Commons on May 23rd on the report stage of the bill introduced as the "Dogs' Protection Bill" by Sir Frederick Banbury is printed at page 684. The second reading of the bill slipped through at the end of a day in the House of Commons, and then went to the Standing Committee, where, owing to the form of procedure, it was not materially modified, although Sir Hamar Greenwood (Parliamentary Under Secretary to the Home Office) introduced the amendment, now carried, providing that experiments on dogs should be permitted subject to the provision that an additional certificate should be provided, setting out that, for reasons specified in it, the object of the experiment would necessarily be frustrated unless it were performed on a dog, and that no other animal was available for such experiment. Science in general, and medical science in particular, is greatly indebted to Sir Hamar Greenwood for the stand he took, and the general tone of the speech in which he commended the Government amendment to the House. The opponents of the progress of medicine by research may be assumed to have made out the best case they could for resisting the Home Office amendment, but they were met on every point, and defeated by a majority of 78 in a House of 216. The bill now awaits third reading, and this has been provisionally put down for June 27th. As was said in an earlier article, while recognizing the value of the stand made by the Home Office, we should prefer to see the bill negatived on the third reading, and we understand that the medical members intend to move its rejection. Sir Auckland Geddes, in the course of the debate on May 23rd, made a speech which in substance, though not in form, gave ample reason for rejection. He dwelt on the absolute necessity to foster in every school of science if it was to be efficient, and in every nation, the desire for knowledge for its own sake; there was no stronger way, he insisted, of destroying that spirit than by putting up artificial legal barriers against it. He struck the right note when he said that everything that interfered with knowledge and the development of science must be opposed, and that while adequate supervision was desirable, it must be supervision designed to help and not to hamper. This puts the matter on high ground of public policy, and exactly expresses the desire of the various antivivisection societies, which is, in fact, to hamper the advance of knowledge.

THE WOMEN SURGEONS AT ROYAUMONT.

INSTEAD of the usual monthly meeting of the London Association of the Medical Women's Federation a dinner was given at Gatti's Restaurant on May 22nd in honour of Miss Frances Ivens, M.S., and her medical colleagues who had received the Croix de Guerre in recognition of their services at the Abbaye du Royaumont Hospital in France. About 140 members and guests were present. Among the guests were Dr. E. Courtauld, Dr. Ruth Nicholson, and Miss Edith Stoney (from the Abbaye du Royaumont Hospital), Sir William Barrett, Mr. James Berry, Dr. J. Walter Carr, Mr. Joseph Cunning, Mr. Willmott Evans, Colonel Elliott, Dr. Eichholz, Sir Walter Fletcher, Mr. J. Gay French, Mr. Joll, Dr. Neal, Senhor de Navarro, Mr. Norman Patterson, Sir Humphry Rolleston, Dr. Sainsbury, and the Hon. Crawford Vaughan. The President, Lady Barrett, in proposing the healths of Miss Ivens and her colleagues, referred to the fact that Miss Ivens had received the Decoration of the Legion of Honour as well as the Croix de Guerre. In reply, Miss Ivens described some of their experiences at the Abbaye du Royaumont and at Villers Cotteret. The French Red Cross authorities accepted the services of a Scottish Women's Hospital Unit early in the war, and they went out to find the Abbaye not prepared for occupation as a hospital. After some delay and much difficulty in rendering it suitable they began work with six patients, but this number soon increased to 300. For some time a branch hospital was carried on very near the fighting line, but when the Germans at last broke through it had to be evacuated quickly, amputation and other serious cases being moved the day after operation. Miss Ivens said that the work she had done had been done because she liked it, and that they had all tried to make the French soldiers feel that the English and Scottish women were their friends.

MEDICINE AND LETTERS.

MEDICINE and letters have at all times had close bonds; it would be strange if it were otherwise. Among the immortal writers of our country Sir Thomas Browne, Tobias Smollett, Oliver Goldsmith, and John Keats can be claimed by the medical profession. Sir Thomas Browne practised physic first in Oxfordshire, and then for many years at Norwich; his eldest son was President of the Royal College of Physicians. Smollett's writings owed something to his experiences as surgeon's mate in H.M.S. *Cumberland*, and after quitting the sea he practised for a while in Downing Street. Keats, after an apprenticeship of four years at Edmonton, became a student of the United Hospitals in the borough, was a dresser at Guy's, and became a Licentiate of the Society of Apothecaries in July, 1816; he is said to have practised surgery, but any ambitions he had in this direction were abandoned in less than a year. Goldsmith, who took the degeee of B.A. at Trinity College, Dublin, in 1749, is said to have graduated in medicine during his wanderings on the Continent somewhere about 1755, but authorities differ as to whether it was at Louvain or Padua. On his return he set up as a medical practitioner in Bankside, Southwark, but without success, for he tried to get a medical appointment to a factory on the coast of Coromandel; having been plucked at Surgeons' Hall in 1758 at the examination for "hospital mate" he seems to have finally abandoned medicine. At the present day St. Bartholomew's Hospital counts among its sons the Poet Laureate—student of classic models and experimenter in new rhythms—and its historian, whose great work will rank beside masterpieces. The Regius Professor of our art at Oxford and at Cambridge, each in his own way, adorns the world of letters. Dr. Mercier is a force in literature no less than in logic and in medicine; and Mr. Stephen Paget is known to be the author of polished essays. There are three living members of our profession who left practice at an early age to make

their names as novelists—Conan Doyle, de Vere Stacpoole, and Somerset Maugham. The last named, indeed, has won greater fame as a playwright, and during the last ten years the London stage has seldom been without one of his comedies; as many as three or four were running in London in the same season. Each of these writers of fiction has here and there drawn upon his medical knowledge for incidents, character studies, or settings. The editor of a great medical journal has written a good biography, an ingenious novel, and a book of sparkling short stories. Dr. Andrew Balfour earned considerable reputation as an historical novelist before he began to devote his energies to the study of the parasitic diseases of the tropics. Major Johnston Abraham and (we believe) Captain Maurice Nicoll also admit the authorship of amusing novels. Dr. Ronald Macfie has more than one volume of verse to his credit, and Dr. Habberton Lulham's poems are known to many lovers of Sussex. During the war one of our younger members, who bears an immortal name, published, while serving in France, a slender book of verse showing much promise. The list could be extended without difficulty, but it will serve to show that we have now among us writers of the most varied kind—from those whose active profession is no longer medicine but literature, to those who have found time in the rare intervals of a busy medical life to add something worth remembering to the stock of English prose or verse.

METABOLISM OF FEMALE MUNITION WORKERS.

AT the meeting of the Royal Society on May 22nd M. Greenwood, C. Hodson, and A. E. Tebb presented a report on the metabolism of female munition workers founded on observations made upon forty-three women engaged upon twelve different processes in the manufacture of projectiles. The rate of metabolism was determined by the method of indirect calorimetry. Making the allowance for metabolic needs during non-working hours recommended by the Royal Society Food (War) Committee, the workers were found to fall into four classes, for each of which the daily net requirements per average woman were 2,530 calories, 2,810 calories, 3,200 calories, 3,425 calories. The results were concordant with the inferences drawn from a study of food consumption in a large explosives supply factory during the war. The figures obtained in this experimental work were somewhat larger than those reached by Becker and Hämäläinen. At the same meeting O. Rosenheim reported the results of direct determinations (by the Douglas-Haldane method) of the energy expenditure of women during periods of rest, recreation, and work (on the lathe). By means of the data obtained, an approximate estimate of the daily food requirements, expressed in calories, was reached, the results agreeing with those of previous workers obtained by indirect statistical methods.

SOCIETY FOR RELIEF OF WIDOWS AND ORPHANS OF MEDICAL MEN.

THE annual general meeting of the above society was held at 11, Chandos Street, Cavendish Square, on May 15th, when Sir Alfred Pearce Gould, President, was in the chair. The report for 1918 showed that the invested funds of the society now amount to £144,250. The sum of £4,288 5s. was distributed amongst the widows and orphans in receipt of grants. The expenses of the year were £273 9s. Attention was drawn at the meeting to the difficulty of getting new members; at the present time the society consists of 159 life and 132 ordinary members, which is a very small proportion considering that membership is open to any registered medical practitioner who at the time of his election is resident within a twenty mile radius of Charing Cross. The annual subscription for a member who at the time of his election is under 40 years of age is £2 2s., if over 40 but under 50 £3 3s., and if over 50 £4 4s. There are special terms for life membership. Relief is only granted to the widows and orphans of deceased members. A widow of a member who is left with an income of £100 per annum or under, as a rule receives from the society a grant at the rate of £50 per annum from the ordinary funds and one of either £10 or £25 per annum from the special funds, according to her age; in addition a Christmas present of £10 is usually made to each widow. The grant to an orphan from both ordinary funds and special, as a rule, amounts to £43 a year. The society is both provident and beneficent; should a member die and leave his widow well provided for he nevertheless by his subscriptions will have helped the widow and orphans of a necessitous fellow practitioner. The invested funds of the society can never be touched, and only the income derived from such funds may be used for the payment of grants. All life subscriptions and legacies must be funded. Further particulars of the society may be obtained from the secretary at the offices of the society, 11, Chandos Street, Cavendish Square, W.1.

THE ROYAL SOCIETY'S CONVERSAZIONE.

IT has long been the custom of the Royal Society to give two conversaziones in the early summer. This custom, suspended during the war, was resumed on May 28th, when a series of demonstrations illustrating recent advances in science were given. Their number seemed rather smaller than usual, but their interest was certainly not less. Of those concerned with biology, that which stimulated curiosity most was given by Mr. E. S. Goodrich, F.R.S., and Mr. A. F. Coventry. In 1910 Professor Bataillon discovered that the unfertilized eggs of a frog would develop if removed from the oviduct and pricked with a very fine needle. The exhibitors found that some 80 per cent. of the eggs so pricked underwent cleavage, a much smaller number passed through later stages of embryo formation, and a very small percentage developed into tadpoles, and some even succeeded in metamorphosing into frogs. Several tadpoles thus obtained were shown swimming vigorously, and one very diminutive but apparently perfectly formed "fatherless frog," which had not survived. Sir Almroth Wright, Mr. L. Colebrook, and Mr. A. Fleming demonstrated methods employed in the study of wound infections which we would despair of making intelligible without diagrams. It may be stated briefly that the experiments showed that white blood corpuscles collected from the blood *in vitro*, or freshly arrived in the wound, were capable of killing great numbers of microbes, but failed if injured by drying, or if an excess of fluid enabled the microbes to keep out of their reach. In the course of the investigation the part played by the blood fluids was also examined. It appeared that the unaltered blood serum provided a very favourable medium for the growth of most of the types of bacteria (sero-phytic) met with in wounds, but that a few, notably streptococci and staphylococci, could grow in it quite unchecked. On the other hand, if the blood serum was "corrupted" by the abolition of its antiproteolytic property, as it is in a wound, all the other types of bacteria (sero-saprophytic bacteria) were enabled to grow freely. If the alkalinity of the blood serum was "blunted off," as in acidosis associated with shock, the gas gangrene bacilli were enabled to grow freely. Two lantern demonstrations were given, the one by Major Kaye and Dr. R. Knox illustrating the use of *x* rays in examining aeroplane timber and aeroplanes. The fluorescent screen readily revealed bad workmanship and hidden defects in the interior of spars and struts which could not be seen by ordinary visual examination. The other lantern demonstration was given by Dr. R. T. Leiper, who showed a series of photographs illustrating the experimental transmission of the bilharzia infections of man, and incidentally gave an account of the investigation carried out for the War Office and the Medical

Research Committee when he went to Egypt in 1915. It was shown that the vesical and dysenteric lesions of bilharziosis were caused by two different species of worms, that the intermediate host was a different fresh-water snail, and that the bilharzia entered the body of man through the skin or through the mucous membrane of the mouth. Dr. Leiper discussed briefly the measures of prevention which seemed feasible and pointed out that advantage might be taken of the peculiar physical and meteorological conditions of Egypt. In that country there was practically no rainfall during the year, and absolutely none during the summer months. The whole of the water of Egypt was derived from the Nile and distributed under the control of the Irrigation Department of the Government. In some districts irrigation water was supplied all the year round, in others only periodically; in these latter districts the ground fell out of cultivation during the summer months and the incidence of bilharziosis was very low, whereas it was high in the districts in which the land was irrigated perennially. Water was absolutely essential to the life of the snail—the intermediate host—and also for that of the bilharzia itself outside the human body. The great increase of the disease in Egypt appeared therefore to be associated with the introduction and extension of perennial irrigation since the beginning of the nineteenth century. The perennial irrigation channels provided suitable places for the snails and enabled them to survive from year to year, when formerly they would have been killed off in enormous numbers by the drought which every year follows the fall of the Nile flood. In some parts of the districts which are irrigated all the year round the water was cut off from the channels for periods of three weeks in every month; with the disappearance of the water from the channels large numbers of the snails perished, as they had no opercula and could not withstand prolonged desiccation like operculated forms. Owing to irregularities in the beds of the canals, however, pools of water were left in which enormous numbers of the bilharzia-carrying snails were found to congregate; there they survived until the next period of flow. As molluscs are relatively slow breeders it seemed feasible to eliminate the molluscan hosts of the bilharzia by a temporary adjustment of their environment, either by drying the pools or by treating them with an acid solution, to which the cercaria, the free swimming stage of bilharzia, was very sensitive. The tablets of acid sodium sulphate used for sterilizing water were efficient; chlorine as used for sterilizing drinking water was useless. As the cercariae entered through the skin it was necessary to destroy them in water used for ablution; this could be done by the addition of lysol, creolin, or army cresol. The strength should be 1 in 10,000 for immediate use, or 1 in 50,000 if the water could be allowed to stand for some hours before use. Ordinary sand filters were useless. Dr. Leiper concluded by a brief reference to the political and social significance of the matter, and spoke of the importance of early Government action, since the frequency of the disease had greatly increased in Egypt, and was producing a high mortality, especially among children. We seem to remember that one of the reasons assigned by Egyptians for recent unrest was that their children were dying in large numbers, and that this was the fault of the Government. Perhaps it is.

TUBERCULOSIS IN THE WEST INDIES.

THE death-rate from tuberculosis in some of the West Indian islands has in times past been exceedingly high. The persistent efforts of European residents in Trinidad, Tobago, and the Guianas have succeeded in materially reducing it by means of dispensary, sanatorium, and hospital treatment. The thirteenth annual meeting of the Association for Prevention and Treatment was held at Port of Spain in Trinidad last Christmas, and by the report recently received it would appear that mortality has been reduced by nearly 50 per cent. since the work of the association was started in 1905. Such a result is all the more satisfactory because a variety of mixed races has had to be dealt with, living under conditions of overcrowding and general lack of domestic hygiene. But it would appear that such people, if taken in hand sympathetically, have been fully appreciative of the importance of the advice given to them, and have been quite willing to act upon it. As in other places where consumption is rife, there is a tendency to conceal the real nature of the complaint, and unless notification is enforced there must always be a considerable amount of latent disease in such communities. The West Indian native, if treated on rational lines in the early stages, seems to be quite as capable of recovery as is the British patient, and hence the accepted theory of the special susceptibility of such natives is somewhat discounted. Although so greatly reduced, the death-rate from consumption in Trinidad is still far too high, being little short of 3 per cent.

LONDON CLINIC FOR TROPICAL DISEASES.

THE Seamen's Hospital Society has now acquired premises in Euston Square, formerly named the Endsleigh Palace or University Hotel and known during the war as the Endsleigh Palace Hospital for Officers. It is proposed to open the premises shortly as a hospital for the treatment of tropical diseases. The Red Cross has generously contributed towards the new scheme, and has endowed thirty beds for the use of sailors and soldiers who have contracted tropical disease on active service abroad. The hospital will be intimately associated with the London School of Tropical Medicine. In the past the Seamen's Hospital Society has played an important part in the development in London of graduate facilities for medical men. The establishment of a special teaching hospital for tropical medicine in the heart of London should powerfully help the present movement to make London the great centre of study for overseas graduates.

THE King has appointed Colonel W. T. Lister, C.M.G., F.R.C.S., ophthalmic surgeon to the London Hospital, to be surgeon-oculist to His Majesty's household. Colonel Lister has been consulting ophthalmic surgeon to the armies in France since 1914.

THE Croonian Lecture on the biological significance of anaphylaxis was delivered on May 29th, before the Royal Society, by Dr. H. H. Dale, F.R.S., director of the biochemical and pharmacological department of the Medical Research Committee.

Medical Notes in Parliament.

Ministry of Health: Future of Medical Service.

DR. A. C. FARQUHARSON, on May 28th, asked the President of the Local Government Board whether he was intending to introduce a bill this session which would establish a new system of general medical services for the population, and, if so, whether such bill will provide a whole-time salaried service of doctors, including hospitals and clinics. Dr. Addison, in a written answer, replied as follows: No, sir; immediately the Ministry of Health Bill becomes law, I intend to set up the Consultative Councils under the bill, including one to advise upon medical and ancillary services, as I have already explained to the House. To them I shall at once refer various questions in respect of the development of local health services, as I am anxious to proceed as speedily as possible with these matters; but I shall not submit any proposals to the Government on those matters until I have obtained their advice.

Dogs' Protection Bill.

The Dogs' Protection Bill, introduced by Sir Frederick Banbury, came, as amended by a Standing Committee, before the House of Commons on May 23rd. The main debate on the Government amendments took place on a preliminary qualifying amendment to the first clause. This clause as presented on report was as follows:

Notwithstanding anything in the Cruelty to Animals Act, 1876 (hereinafter referred to as "the principal Act"), it shall be unlawful to perform any experiments of a nature calculated to give pain or disease to any dog for any purpose whatever, either with or without anaesthetics, and no person or place shall be licensed for the purpose of performing any such experiments.

The amendment by Sir Hamar Greenwood, Under Secretary for the Home Department, was to add the words, "except as hereinafter provided." The subsequent amendment to be proposed was to omit from the clause the words following the word "anaesthetics" and to add instead the following words:

except on such certificate being given as is mentioned in the principal Act stating, in addition to the statements required by Section 3 of that Act to be made in such certificate, that for reasons specified in the certificate the object of the experiment would necessarily be frustrated unless it is performed on a dog, and that no other animal is available for such experiment.

Sir Frederick Banbury, in asking the House to accept the bill as it stood, referred to a letter which had been written by Sir Edward Schafer to *The Times*, and reproduced as a leaflet by the Research Defence Society. Therein it was said that no operation whatever could be performed on a dog without the express sanction of the Home Secretary. He submitted that this statement was absolutely inaccurate. It was true that an applicant for a certificate had to forward a copy, signed by one or more of certain persons of eminence named, to the Home Secretary, but if he were occupied with other things, it would, according to the law, become valid without his sanction. The section dealing with the matter said it "shall not be made available until one week after a copy has been so forwarded."

Captain Elliott, interpolating, said that there was printed on the certificate in red ink: "Experiments are not to be performed under this certificate until the licensee has been informed that it has not been disallowed by the Secretary of State." That seemed to him to be an absolute protection.

Sir Frederick Banbury, continuing, said he was talking about the law, and the law did not compel that those words should appear. Sir Frederick went on to refer to the evidence given before the Royal Commission, quoting in the first instance that of Dr. Pembrey to the effect that experiments which caused pain were in his opinion necessary, and that it was necessary to have them without anaesthetics. Sir Edward Schafer had said that dogs were absolutely protected from suffering, but Sir Frederick asked whether the House thought garrotting was not a painful experiment, and again quoted Dr. Pembrey, who, after saying that garrotting was not in his opinion a painful experiment if done properly, had added, "I consider it perfectly right to inflict pain upon animals." Sir Frederick next quoted from a speech by Dr. Wilson, who was a member of a commission appointed in 1906. He cited from Dr. Wilson's address to the British Medical Association at Portsmouth in 1899 wherein he said "there should be some pause to these ruthless lines of experimentation," and protested against the after-effects of the injection of virus —"a long-drawn-out agony." Sir Frederick next read a letter he had received from Sir William Collins, M.D., formerly M.P. for Derby, which was as follows:

Allow me to congratulate you on the success which has so far attended you on the Dogs' Bill. You will, of course, have noticed paragraph 95, page 57, in the report of the Royal Commission, which, if I remember rightly, I drafted.

He had, he said, letters from other doctors to the same effect, and the petition prepared by the Royal Canine Defence League had been signed, he thought, by something like 1,300 doctors. The opposition from the medical men to prohibition had always existed; they opposed the Act of 1876. The Home Secretary had stated that these matters were dependent on certificates, but it was the Act they had to look to, and not to any Home Secretary. Sir Frederick then quoted the law as follows:

If an animal, by reason of any of the said experiments, under the said certificate, is found to be suffering pain which is severe, and likely to endure, and if the main result of the experiment has been attained, the animal should be forthwith killed. . . . If an animal, after the said experiment, is found to be suffering from severe pain likely to endure, such animal should be killed.

The two statements were, he urged, absolutely contradictory. The first said that the dog should be killed if the main result had been attained, and the second that it should be killed only if it were suffering severe pain likely to endure. Who was to judge? Those gentlemen who said that they did not think it harmful to give pain if it was necessary to give pain. In conclusion, Sir Frederick, dealing with the question of the value of experiments, quoted Dr. Douglas Cowan, who, after giving a description (in the *Journal of Physiology* of March 21st, 1914) of sixty-five observations on three dogs, wrote: "The success of the matter (the experiments) is largely a matter of chance . . . no positive result was ever obtained following injection."

In evidence of the extent of the experiments and the time taken, Sir Frederick quoted from the *Journal of Physiology* for February 27th, 1899, the following: "Terrier: Right kidney mutilated 27th June, 1890; left kidney removed 8th August, 1890; killed 27th August, 1890."

Mr. Rawlinson was glad that the Government had put forward the amendment, but said he should still object strongly to the bill on the third reading. He asked whether there was any other country in the world where men of science were confronted with the pains, penalties, and restrictions to which they were subjected already in this country in following out research. Men of science who were attempting to do work of the greatest possible use to humanity, instead of being regarded as benefactors of the human race, were subject to licences which some in that House looked on as unnecessary insults. In view of the fact that experiments of this kind must be made, were they to be made upon animals or upon human beings? Was this the only country pharisaical enough to impose these restrictions upon medical men? But the matter did not stop there. Were the antivivisection societies merely to be content to save the dog? They would go on to prevent vivisection on every kind of animal, and that, after all, was the only logical outcome. There were very few doctors in favour of this bill—most agreed that it would do a great injury to medical research. Those who were opposing this measure represented a large profession. In family crises the doctor was trusted to perform operations and for other responsibilities. Ought he not to be trusted on this question also? Was it really believed that the medical members of the House who were opposing this bill favoured operations on dogs for the sake of cruelty? They pledged their professional reputation that it would be wrong to pass this bill, because it would be a serious injury to medical science. Could they have any motive for deceiving the House?

Captain Elliott said there were some things in Sir Frederick Banbury's speech which could not go unchallenged. He had traversed what Sir Edward Schafer had said. He spoke of "all suffering" when he should have said "all unnecessary suffering." Captain Elliott next took up Sir Frederick's reference to the Home Secretary. Clause 8 of the Act of 1876 was:

The Secretary of State may license any person whom he may think qualified to hold a licence to perform experiments under this head.

In these circumstances it was fallacious to try to get the House to believe that the governing thing was a certificate from doctors. The statement that an experiment could not be conducted except under licence from the Home Secretary was absolutely correct. Moreover, doctors objected to the name of this bill. The Dogs' Protection Bill was not a bill to protect dogs. They might be mutilated, and were, without any anaesthetic, by all sorts of people, so long as these people were not qualified scientists. The operation of docking a dog's tail was a case in point. It was done by hundreds of thousands of people every year. If a Dogs' Protection Bill was the right title, the measure ought to protect dogs even against the dog fancier and the man in the back shop with the rusty knife. There were 3 or 4 million dogs in this country, and of these a few scores were operated upon by scientists, while hundreds of thousands were operated upon by sporting gentlemen. The bill said it should be unlawful to conduct any experiment calculated to give pain or disease to any dog for any person whatsoever. Experiments were now being carried on of the utmost promise to the human race, which this bill would bring to a dead stop. Supposing that a feeding experiment might produce a diseased condition, but one which was not necessarily painful, the experiment would be prohibited under this bill. One of the gravest diseases affecting the children of industrial towns was rickets. It caught the child at its most delicate moment when its bones were soft, and when very often there was ignorance on the part of the parents as to what was happening. On account of

some deficiency, some little minor constituent, either in its environment or diet, the bones of the child remained soft, its backbone was bowed, its legs were bent out, and it was diseased and crippled for the rest of its life. Ten years ago Dr. Leonard Findlay and Professor Paton of Glasgow initiated experiments to find out what they could about this disease. There were experiments going on also in Cambridge, London, and other parts of England. Sir Frederick Banbury made play with the nobility and devotion of dogs, but what about those qualities in children? Margarine was a perfectly good food, excellent for fully grown up people, but experiments and research were tending to show that it was deficient in vitamines. This constituent was very small in amount. Vitamines occupied no more bulk in the food than did glue in the construction of a chair, yet they were vital to the creature fed on this food. If it were found that margarine was deficient in this respect, it was not fit for consumption by a growing child. Butter did contain vitamines, and here was an immediate case of research bearing actual proof at this moment. They saw that to these vegetable oils in margarine must be added some animal fats—suet or butter—so that the margarine might be safe for consumption by growing children. Would they wipe out an experiment like that, and bring it to a dead stop? These feeding experiments could be conducted only on dogs. Was it seriously said that they should conduct these experiments on growing children? He had a record of experiments conducted on growing children in the United States. In one case thirty-two children had a supply of these vitamines, and only two developed rickets. In the other case sixteen did not get any of the vitamines, and fifteen developed rickets. Ninety-four per cent. were diseased in one case, and 7 per cent. in the other. Surely when these children grew up they would look that experimenter in the face and ask him what right he had to condemn them because he would not carry on the experiments on animals. He was not quite sure whether the Speaker ruled out of order all amendments put down relating to cruelty to dogs in other cases.

Mr. Speaker: In my judgement, none of these amendments are applicable to the bill. The title of the bill is to "prevent the vivisection of dogs." Vivisection is a term which is well known, and any curtailment to increase the selling value of a dog, or anything of that nature, is beyond the scope of the bill.

Sir H. Craik: On a point of order. Surely vivisection is in no way confined to operations which are carried on for scientific purposes. Vivisection surely means the cutting of live creatures. In what possible way could vivisection be confined solely to operations of cutting which have for their object scientific ends?

Mr. Speaker: If the hon. gentleman will look at the Act he will find that it relates to the "discovery of physiological knowledge or knowledge useful for saving or prolonging life and alleviating disease." That I take to be the definition of vivisection for this purpose. It is the object of the bill, and it is what the House meant when it agreed to the second reading. What I conceive to be that object was that the vivisection of animals for purposes of medical research was not to include the vivisection of dogs. That was the meaning at the second reading of the bill, and consequently the discussion must be confined within the four corners of that. The very first words related to the Act of 1876. It was an amendment of that Act.

Captain Elliott, continuing, said that the bill as it went up to Committee did not contain any such reference, and he did not suppose that its amendment altered the original form of the bill, but he was glad to receive instructions. Referring to the list of persons supporting the bill, Captain Elliott chaffed Sir John Butcher upon finding himself in strange company, prominent on the list being the name of her Serene Highness Princess Ludvig von Lowenstein Wertheim.

Sir John Butcher protested that he had never heard of the name of the lady before.

Captain Elliott, summing up his argument for the amendment, said the case in favour of experiments on animals was overwhelming. No evidence had been received in that House to rebut the points made by every learned society in Great Britain. The Statutory Committee which was set up by Parliament for the purpose of alleviating pain and assisting research made a unanimous report against the proposals in the bill. He had referred to feeding experiments which he happened to know himself. They were entirely painless, yet they required a certificate signed by two eminent gentlemen, and must subsequently be allowed by the Home Office. He left other members to deal with the surgical experiments; in nine cases out of ten these were not only conducted but were concluded under full anaesthesia, and the animal had no feeling of pain throughout the operation.

The Speaker said that perhaps the House would allow him to say that since Captain Elliott had called his attention to it he had looked at the bill as originally produced. His attention had not been called to the change which had been made in Committee. On looking at it closely, he thought that he was rash and wrong in saying that the amendments mentioned went outside the bill. He thought that some of them did come within the limits of the bill as passed on the second reading.

Lieut.-Colonel Spender Clay, after referring to the shoals of letters he had received asking him to support the bill, said that, while he should like to do all he could to alleviate the sufferings of dogs, he felt bound to support the amendment. He thought, however, that something might be put into the bill to strengthen the position of the inspectors who examined the conditions under which the animals were experimented on. He understood that they were few in number. He believed that if the number were increased, and that they were given a better position and paid surprise visits, the situation would be more satisfactory.

Colonel Burn supported the bill. He had not found any convincing proof that the dog was the only animal from which these results could be obtained. Under the Act it was legal to keep a dog alive after an operation for observation, and even to experiment upon it a second time. He brought up a few years ago in that House the case of a dog in Edinburgh, if he remembered rightly, that had been operated upon, and this dog was found running about the streets of Edinburgh with an open wound. It was the abuse of vivisection in places like that which made members feel that the bill was necessary. There might be difficulty in feeling sure that those results were applicable to human beings. He could only speak for himself, but if it were his fate to be stricken with a fell disease he should be only too delighted to bequeath his body to the surgeons to do whatever they liked with in the interests of research.

Sir Auckland Geddes (Minister of Reconstruction), speaking as a teacher in medical schools, said he had great sympathy with a man who said, "The dog has been my best friend; I cannot picture that dog being subjected to an operation in order that knowledge may be required." He understood that man's point of view, and had taken many such round the university to show them what was meant by vivisection. The question that presented itself to the physiologists was, "What animal can I use that is accustomed to a diet like a man's diet, that is accustomed to a living environment like a man's, unless I take a dog?" It was no use saying, "Take a monkey"—a monkey was not accustomed to live with men. Cats were to some extent, goats were not, pigs were not, guinea-pigs were not, and so on through the whole scale. Thus there were certain types and classes of experiments which could only be carried out either upon a cat or a dog. The cat was peculiarly unsuitable in many ways for experiments. It was a smaller animal. It had retained more of its carnivorous characteristics, it was less humanized in its diet. For certain classes of experiments it was absolutely essential to choose the dog. Many things could be learnt from the body of a dead child, a dead woman, or a dead man, but some things could not be learnt from dead tissues, but only from living tissues, and the only tissues available in such cases were those of dogs. Many people said they would rather not have the knowledge than cause any suffering to a dog. He did not think that was really in the highest sense a moral point of view, because by withholding man's right to find out, they were dooming man's children to pain and suffering. But that was not all. There were many things that had to be done in the course of an operation, and to those who had not seen many operations, or perhaps had seen none, there could be no understanding of the delicacy of touch and the fineness of manipulation required for success. They had allowed themselves, and were perhaps in danger now of allowing their surgeons, to be swayed by sentiment. This was not a thing where sentiment could rule. It was justice guiding the intellect, a profound sense of justice; it was necessary and right, and it was only just to the people and to the children of this country that our surgeons and physicians should be fully trained and fully educated, and it was upon that ground that he claimed the right for the teachers of science—and in Canada it was fully exercised—to have the power to equip with knowledge, with manual skill, and with dexterity the practitioners of medicine and surgery who passed from the university to practice. But education was something more than technical training. Unless there was behind the education the whole spirit of research, the will to

know the truth for truth's sake, the education would be sterile. It would not be education, but merely technical instruction. Therefore it was really in the most vital interests of this country that her schools of science should be empowered to investigate and to impart instruction about those mysteries which proceeded within the body of living things. It was absolutely necessary that there should be in every school, if it was to be efficient, and in every nation, if it was to be efficient, that desire for knowledge for its own sake, and there was no stronger way of destroying that spirit than by putting up artificial and legal barriers.

Sir Frederick Banbury, interposing, asked whether the Minister was against restrictions.

Sir Auckland Geddes replied that he was against everything that interfered with knowledge and the development of science. He considered that the Act of 1876 had done more harm to British interests than almost any other Act passed in that House. He was not against adequate supervision. He knew from what he had seen on the continent of Europe that supervision was necessary, but it must be supervision designed to help and not to hamper. He appealed to those who felt there was something cruel in experimenting on dogs to think of the children. During the two years of the war in which he was responsible for medical examination of recruits it was driven in with greater and greater force that the population of this country was suffering from a high degree of physical inefficiency, from causes wholly preventable if science were given fair play and allowed to develop. There was no more pathetic debate in his recollection than this: that in a matter like this they should be appealing to feelings of sentiment when they were dealing with the highest physical interests of the country. He asked the House to see that before this bill left its hands everything was removed from it which would hamper the development of science and of knowledge.

Mr. C. White, in supporting the bill, asked the House to remember that there were medical men in this country, distinguished and of great experience, who were against the arguments just put forward, and quoted the opinion of Dr. Robert Bell and of the late Mr. Lawson Tait of Birmingham. He further quoted what had been said by Sir Frederick Treves, who was not an antivivisectionist but had declared that he had found himself much hampered by experiments which he had carried out on the Continent on the intestines of dogs. He asked further who was to be the judge as to whether the experiments were carried out as they should be. It was impossible to give anaesthetics in some experiments.

Mr. McMicking asked for information as to the meaning of the new certificate. Would it reduce the number of experiments or the suffering to which dogs were exposed in experiments? Certificates A and E were given for operations without anaesthetics on dogs, and coupled with them there was what was known as the "pain condition," which was a condition that if the animal was suffering severe pain it had to be destroyed. With regard to Certificate A, Mr. McMicking quoted from the Royal Commission on Vivisection (p. 58, para. 88) to the effect that even if the initial procedure under the certificate might be regarded as trivial, the subsequent results must, in some cases at any rate, be productive of great pain and much suffering. This, he wished the House to appreciate, was signed by all the signatories to the report. Under Certificate B operations took place under anaesthetics, but the animal was allowed to recover from the effect of the anaesthetics, in order that the result of the operation might be observed. That, again, was coupled with the pain condition. How was it possible for anybody to tell what pain the dog had? Mr. McMicking quoted from the *Journal of Experimental Physiology* certain cases of experiments. In one case it appeared that an anaesthetic was administered to a cat, that the experiment lasted for several days, and that apparently no other anaesthetic was administered. He quoted another from the *Journal of Experimental Physiology*, p. 204, as to an operation on a dog. This experiment lasted about seven days, and apparently anaesthesia was induced on the first, third, and seventh days. He also referred to the sensitiveness of the dog, and to the evidence of Sir William Thornley Stoker, the late Inspector for Ireland, who said that experiments on dogs ought to be allowed only with the greatest possible care, because they felt so much.

Sir W. Whitla, in supporting the amendment, said he would much rather oppose the bill altogether. He absolutely and utterly denied the allegations of cruelty. He accepted the definition that cruelty was unnecessary suffering. They had heard a great deal from Sir Frederick Banbury about the law. He (Sir W. Whitla) could assure the House, from his own personal experience in research in the laboratories of this country and in the laboratories on the Continent, that he had never seen any real unnecessary suffering; he had never even seen any evidence of real pain inflicted in experiments on dogs. Why not go further and say that the lethal chamber should be abolished? Either stop the bill or pursue it to its logical conclusion, and do not allow a dog to die. The doctors asked for a few of these dogs that gravitated to the lethal chamber in order to put them under chloroform, and they asked permission, while these dogs were under chloroform, to watch the effect of some drug on their blood pressure, and as soon as that was determined they gave the dogs a larger dose of chloroform, and sent them to the happy hunting ground. As for the beneficial results, he would take the case of hydrophobia. Nothing could be worse than the prevarication which went on as to that matter. They were told that so many people were known to have died of hydrophobia after treatment at the Pasteur Institute, and that so many people had died of diphtheria; never a word was said about the thousands and thousands of lives saved. The mortality from hydrophobia in people bitten by rabid dogs had fallen from 16 per cent. to less than 1 per cent. Pasteur once showed him a map in which he pointed out that the mortality cases rose with every few hundred miles from Paris. No human being need die of hydrophobia if the treatment were used in time. The same remark applied to diphtheria. On the question of Pasteurism he had a word to say in favour of the dog itself. He saw in the distance a vision of the absolute annihilation of hydrophobia and rabies by the protection of inoculation, and this could be achieved only by experiments properly carried out. No dog should be allowed to be kept unless protected by inoculation, and in time probably every dog would be saved from rabies. He believed that in the future they would be able to combat the greatest enemy of mankind—the white plague of tuberculosis—by the protective power of the dog's serum. He had followed the effects of experiments on tuberculous ulcers. In one case he wished to prepare some of this serum, and found he had to get Certificate A and Certificate B, and had to get this and that from so many people that he was disgusted, and went off to a Paris laboratory, where he could work without all these restrictions. He supported the amendment, not because he loved the dog less, but because he loved man more.

Sir John Butcher, supporting the bill, said there was profound and unexplainable ignorance on the part of many gentlemen who were opposing it. He quoted from Professor Starling's letter to *The Times* on April 19th, wherein it was said that, according to present regulations, the animal had to be fully under the influence of anaesthetic during the whole of the operation and to be killed before recovering consciousness. That was not so. Professor Starling further said that if the object of the experiment required that the dog should be allowed to survive, it must be killed at once under an anaesthetic should pain supervene at any time after the operation. That was not so. It was perfectly true that practice was milder than the law, but it did not eliminate pain. There was really no safeguard that the present practice of the Home Office would be continued. The present safeguards might be destroyed by any future Home Secretary. The practice with regard to killing the dog after an operation was this: that if the object of the experiment had not been obtained, the operator or experimenter was entitled to keep the dog alive, although there was severe pain of a temporary character, or considerable pain which was likely to endure. It was only when there was a combination of the two conditions, severe pain which was likely to endure, that the dog must be killed. If there was temporary severe pain or continuing considerable pain, then in either of those cases the man was allowed to keep the dog alive. Sir John Butcher next recalled Captain Elliott's references to a lady with a German title, whom he spoke of as a leader in the antivivisectionist movement. He, Sir John, had now ascertained that this lady was a British-born subject, belonging to a very old British family, that it was her misfortune to marry a German prince some years ago, and that he had been dead for some years.

Sir Hamar Greenwood, the Under Secretary for the Home Department, replying to the debate on behalf of the Government, said that the object of the bill was the absolute prohibition of experiments on dogs, but the amendment he proposed would give an additional precaution and further supervision on all experiments on this animal, and so make it impossible, as indeed it already was, to inflict upon a dog during the course of any experiment anything but the most limited and short-lived pain. The Government, while prepared to protect the few dogs experimented upon, were not prepared to go against the overwhelming mass of experience and scientific opinion and prohibit absolutely experiments on dogs. He might further say

that the word "vivisection" was not a word of the Home Office. That word did not occur in the original Act of 1876, nor in any document issued under that Act. Vivisection was restricted to comparatively few dogs. The great majority of the operations were simple inoculations or the cutting of small veins, which did not, in the majority of cases, interfere with the comfort or health of the dog. He must protest against the allegation, made more widely outside the House than in it, of cruelty by medical men and indifference by the Home Office and the Government in carrying out this important duty. The total number of persons who held licences during 1917 was 671. Each of those licensees furnished a report, and it was found that only 279 acted under their licences and performed any operation whatever. Out of 55,000 experiments conducted in the year 1917 a few hundred only were experiments on dogs, and most of these were feeding or harmless inoculation experiments that did not hurt the dog. The great majority of these experiments were on rats, mice, guinea-pigs and rabbits. Of these experiments 19,000 were performed on behalf of Government department and public health authorities throughout the country, and 22,600 were for the preparation, testing, and standardizing of serum, vaccine, and other drugs. The dog was used only in those cases where no other animal was available. The conditions issued with the licence, and the certificates issued for certain special purposes, were as much the law of the land as the written word of the statute. If the Home Secretary did not obey the spirit of the Act as well as the letter, he could be challenged in the House of Commons. The House was as much responsible for administration as for legislation. When a person made an application for a licence or certificate, it was referred to the inspector of the district in which he lived. The inspector visited the applicant, made inquiries, reported the facts to the chief inspector of the Home Office, who had spent long and useful years in the sympathetic administration of the law. The chief inspector made his observations to the Home Secretary, and when a severe operation was to be performed, cutting with a knife, the application for a licence was referred to a committee of seven of the most distinguished scientific gentlemen in the realm, each distinguished for his services in the war. When the application had passed through all these stages the licence was sanctioned by the Home Secretary himself, and it was for one year only. It might be renewed from time to time, but the annual application for renewal enabled the Home Office to review conduct. No experiment could take place except in a registered place, except in those rare instances where an outbreak of disease had occurred in animals where no laboratory was available. The registered places were very carefully inspected. The Home Secretary fixed a series of conditions, most of which were drastic, dealing with the antiseptic treatment of wounds, and no operation more severe than simple inoculation, or superficial vivisection, which simply meant the tapping of a vein, might be performed in any experiment, under any of the certificates, without an anaesthetic. The amendment which stood in his name was based on the report of the Royal Commission of 1912. He was quoting from the report signed by all the Commissioners. It was true that three of them made subsequent recommendations, but the paragraph on which his amendment was based carried with it all the members of the Commission. The paragraph was as follows:

> In view of the variety of practice and the divergence of opinion as to the necessity of employing dogs for experimentation and demonstration, we find some difficulty in deciding upon this important question. Some of us regard the provisions of the existing law as sufficient, some of us would prefer that in the case both of experimentation and demonstration the further special protection given to horses, asses, and mules should be extended to dogs, while some of us would exclude the use of dogs altogether. But if any alteration is made in the existing procedure, the majority of us would agree that the special enactments now applicable to horses, asses, and mules might be extended to dogs, and also to cats and anthropoid apes.

Every recommendation in that report, except the one in the amendment now proposed, had been adopted by the Home Office, including the establishment of an Advisory Committee. As for results from experiments, he held that the report of the Medical Research Committee, which had been circulated to members, ought not to be ignored. One of the results had been the localization of the functions of the brain, and by further experiments—on apes—the profession had been able to fix the exact position in the brain of certain diseases, and as a result large numbers of lives had been saved. Pasteur's early work on the nature and transmission of rabies had been carried out on dogs, but there were many questions about which information was still required—as, for instance, the period of incubation. A case had been reported in which a dog developed rabies two hundred days after it had been bitten by another dog. If rabies was to be stamped out it was essential that the longest possible incubation period should be established in order that measures of quarantine might be effective. Any research into the method of treating rabies in the dog and the human being would also have to be worked out on the dog. This country had run out of the supply of Pasteur lymph because the French could spare no more. The President of the Local Government Board had at once started measures for the production of the lymph, which, in spite of all statements to the contrary, was the only known remedy for the prevention of the most horrible disease that could afflict a dog or a man. In this matter of rabies, as in other matters, the dog and the man stood together, and both benefited from the experiments on the dog. Again, distemper, the commonest disease in the dog, could not be remedied except by experiments on the animal itself; that seemed common sense as well as a scientific view. The real divergence of opinion in this controversy was whether they would exalt the man above the dog or the dog above the man. He put the man first—he put the child even before the man. The cures and preventives obtained as a result of the experiments on dogs were innumerable. At this very moment experiments were going on under the Medical Research Committee which would be stopped by this bill, though they had the object of alleviating suffering in the human race.

Mr. Bottomley (interposing): Why not experiment on human criminals if it doesn't hurt them?

Sir Hamar Greenwood replied that that suggestion had, he believed, been carried out on the Continent. In appealing to the House to support the amendment, he spoke not only as representing the Government, but was the willing champion of the honour of the noble profession of medicine, which included tens of thousands of men and women whose mighty work of healing and saving in the war should free them from reproach as fellow citizens from any accusation of cruelty. The passing the bill into law would cast an undeserved stigma on that profession, and he asked the House to enable experiments to be continued, because in the past they had done great good, and would in the future, he believed, do even greater good.

Sir Frederick Banbury then moved the closure, and this was agreed to.

Sir Hamar Greenwood's amendment to Clause 1, that the words "except as hereinafter provided" be inserted was next put. On a division 147 members voted for the amendment, and 69 against.

Sir Hamar Greenwood next moved the principal amendment, as stated at the beginning, setting forth the terms of the grant of certificates. This was then agreed to. Sir H. Greenwood afterwards moved several drafting amendments, and an alteration of the title of the bill from "A bill to prevent the vivisection of dogs," to "A bill to impose further restrictions on the vivisection of dogs." This amendment was agreed to, and the bill was put down to be read a third time on June 27th.

Ministry of Health Bill.

The Ministry of Health Bill was taken for third reading in the House of Lords on May 22nd.

Patent Medicines to come within the Bill.

On Clause 2, stating the general powers and duties of the Minister in relation to health, the Lord Chancellor moved two amendments in order to meet the appeal made in earlier debates, that the Ministry should be responsible for prosecutions for patent medicine frauds. The substance of these amendments was, first, that the "preparation" as well as the "carrying out" of measures as to health should explicitly fall upon the Ministry of Health, and secondly, that amongst the measures in regard to which the Ministry should thus be responsible should be included a measure for the avoidance of fraud in connexion with alleged remedies for the prevention and cure of diseases. In order that the matter may be clearly understood, it may be well to reproduce the clause as presented on report.

> It shall be the duty of the Minister, in the exercise and performance of any powers and duties transferred to or conferred upon him by or in pursuance of this Act, to take all such steps as may be desirable to secure the effective carrying out and co-ordination of measures conducive to the health of the people, including measures for the prevention and cure of diseases, the treatment of physical and mental defects, the treatment and care of the blind, the initiation and direction of research, the collection, preparation, publication, and dissemination of information and statistics relating thereto, and the training of persons for health services.

The amendments provide that the word "preparation" shall be inserted before the words "effective carrying out," and that the words "the avoidance of fraud in connexion with alleged remedies therefor" shall be inserted after the word "diseases." The Lord Chancellor said that he had had long consultations on the previous day with the Director and Assistant Director of Public Prosecutions and with other persons, and his proposals represented a unanimous conclusion. Patent medicine frauds could, under the existing law, be attacked only upon the charge of obtaining money by false pretences. These were very difficult prosecutions, and more often than not failed. The course which ought to be adopted was to strengthen our legislation, and in this connexion he reminded the House of the recommendation of the Select Committee on Patent Medicines in 1914, which was as under:

Your Committee further recommend the following legislative enactments: (1) That every medicated wine, and every proprietary remedy containing more alcohol than that required for pharmacological purposes, be required to state upon the label the proportion of alcohol contained in it. (2) That the advertisement and sale (except the sale by a doctor's order) of medicines purporting the cure of the following diseases be prohibited: Cancer, consumption, lupus, deafness, diabetes, paralysis, fits, epilepsy, locomotor ataxy, Bright's disease, rupture (without operation or appliance). (3) That all advertisements of remedies for diseases arising from sexual intercourse or referring to sexual weakness be prohibited. (4) That all advertisements likely to suggest that a medicine is an abortifacient be prohibited.

These recommendations had quite recently been discussed by the Government, and he was authorized to say that the Government concurred in them. He was further authorized to say that a very early attempt would be made to carry out in a separate bill those specific recommendations. He had also the authority of the Director of Public Prosecutions and of the Attorney-General for saying that if the legislation indicated became law, there would certainly be no remissness on their part in seeing that persons who pursued practices which under this legislation would become criminal should be adequately dealt with.

Viscount Haldane welcomed the announcement because it meant that the bill would be strengthened, as it would become the duty of the new Minister to prepare and procure legislation. There was, however, another difficulty. In Scotland the Lord Advocate had the duty of taking up a prosecution in a matter of this kind. In England there was a Public Prosecutor, but he picked and chose at discretion. He felt the difficulty which the Lord Chancellor pointed out of creating a new department for public prosecution within the Ministry of Health, but he would like something more specific than was contemplated. If an undertaking was given that the Minister of Health would recognize it as his duty to look out for such cases, and to bring them to the attention of the Public Prosecutor, and that the Public Prosecutor would then take them up, the position would be better.

Lord Bledisloe, who had brought the first pressure upon the Government, said he would rest satisfied with the assurance that the promised bill would be introduced at the earliest opportunity.

The Lord Chancellor, in reply to Lord Haldane, said it would, in the opinion of the Government, be a great advantage that the Minister should be able to call in the Attorney-General or the Public Prosecutor on the question of these frauds, and there was no question that the Attorney-General would take a very serious view of his responsibilities.

Both amendments were carried.

The Parliamentary Secretaryship.

Viscount Sandhurst next moved an amendment to rescind the amendment which the Lords had carried in committee—that there should be but one parliamentary secretary, and to provide instead that power should be taken for the appointment of two parliamentary (or under) secretaries. He repeated that in the first instance one of these under-secretaries would be chosen from the Lords. A large amount of work would fall upon the Ministry of Health, and Lord Sandhurst pleaded that the department should be allowed to have the two minor secretaries as well as a chief minister.

The Marquess of Crewe emphasized the objection which was felt in the country to the creation of superfluous ministers.

Lord Downham said that the Government really proposed to create no fewer than five Ministers for Health. They proposed to turn the President of the Local Government Board into a Minister of Health, and to give him two Parliamentary Secretaries for England and Wales, to give an extra Parliamentary Secretary for looking after the health of Scotland, and, as he understood, to give in another bill another Under-Secretary to look after the health of Ireland. He submitted that two Under-Secretaries were not required under the English bill, and he pointed out that the new department would before long be freed of responsibilities connected with the Poor Law.

The Marquis of Salisbury urged that the arguments for having two Under-Secretaries were unsatisfactory.

Earl Curzon renewed the appeal that the amendment should be accepted, but on a division it was rejected by 48 votes to 26.

The amendment came before the House of Commons on May 26th, when Dr. Addison moved that the Commons should disagree with the Lords' amendment limiting the power of appointment of Parliamentary Secretaries to one instead of two as was proposed by the Government. Dr. Addison repeated the arguments already presented in the Upper House, urging that owing to the amount of work to be done two under-secretaries would be needed. Sir Donald Maclean supported the proposal, but asked for an assurance, which Dr. Addison gave, that when the administration of the Poor Law was separated there would be no request for an additional under-secretary. After some discussion the House divided, and Dr. Addison's motion was carried by 170 votes to 25.

Extra Remuneration under the Insurance Acts.—Sir Kingsley Wood asked Major Astor, on May 23rd, the amounts provided during the present financial year as extra remuneration in the nature of a war bonus or otherwise for medical practitioners on the insurance panels, pharmacists on the insurance panels, civil servants and other officials in the employ of the Insurance Commission, and the agents and workers of the approved societies respectively. Major Astor replied that no comparison of amounts provided from Exchequer funds was possible as the number of individuals in the four categories differed widely; one of the four categories received their whole remuneration from Government funds. In the case of the first category the amount to be provided from the Exchequer during the present financial year for war bonus was £300,000; and in the case of the third category it was about £138,000. The increase in the second category could not be easily separated from the total drug fund of which it formed a part. The remuneration of individuals in the fourth category was not met from Exchequer funds except as regards the two-ninths contribution to the administrative expenditure of the approved societies which employed them, and fixed their remuneration; the Commissioners had no information as to extra remuneration given by approved societies to their officials.

Burial of Stillborn Children: Legislation being Considered.—Mr. Gilbert, on May 22nd, asked Major Astor whether the attention of the Local Government Board had been called to an inquest lately held on a stillborn child by the Southwark coroner, when certain practices were disclosed as to the burial certificate given by the midwife; and whether he proposed to recommend the alteration of the law to end the practice of allowing midwives to give certificates for burial. Major Astor said the answer to the first part of the question was in the affirmative. Dr. Addison would consider the advisability of altering the law.

Registration of Nurses.—In the House of Lords, on May 27th, Viscount Goschen moved the second reading of the Nurses' Registration Bill, which proposes that the College of Nursing (Limited) should be entitled to bear the title, "The College of Nursing," without the addition of the word "Limited," and that the college should be administered by the General Nursing Council. The measure further provides that every nurse registered under the Act should be entitled to vote at elections of the General Nursing Council. Lord Ampthill moved the rejection of the measure, his principal contention being that the Nurses' Registration Bill, introduced in the Commons on March 28th by Major Barnett and already well advanced in that House, held the field. To the consternation of the officials of the House, there was some clapping of hands by nurses in the strangers' gallery at one of Lord Ampthill's observations. On a warning by the Yeoman Usher the demonstration stopped. Viscount Sandhurst, for the Government, favoured the second reading of the measure brought forward by Lord Goschen, and several peers expressed the hope that both Major Barnett's bill and this would be considered by a joint committee of the two Houses. Lord Sandhurst, while unable to give any undertaking on this point, promised to convey the suggestion to the President of the Local Government Board. Lord Knutsford, while attaching little or no importance to registration by itself, gave his support to Lord Goschen's bill as being, in his view, the better of the two. On a division the second reading was carried by 61 votes to 20.

Medical Officers at Batoum.—Mr. Forster, replying to Sir Arthur Fell, on May 27th, on a question whether it was necessary to keep at Batoum with the British forces medical men who were married, over 41, and who had spent fourteen months or more with the Salonica forces, said that medical men were being demobilized as fast as the military situation permitted, but at present it was impossible to demobilize all who were eligible. The importance of relieving medical officers deserving of consideration on the score of age or length of service was fully realized, but at present it was not practicable to send out reliefs.

Hospital Sites in London.—Dr. Addison, replying to Commander Bellairs, on May 27th, said he was not aware that the sites of London hospitals had ever been considered as a whole. The decision of the St. George's Hospital Committee to extend its present hospital was not one on which the Local Government Board had any power to interfere.

India.

GROWTH OF MEDICAL RESEARCH IN INDIA.

IN a speech to a recent meeting of the Imperial Legislative Council, Major-General W. R. Edwards, C.B., Director-General Indian Medical Service, spoke of the vital importance of medical research as a part of the activities of a Government.

Work during the War.

He prefaced his remarks with an account of the war work of the bacteriological department in India. The majority of its members had reverted to military duties, where they formed the major part of the staffs of the central laboratories in Mesopotamia, while those who remained in India were mainly engaged on the preparation of vaccines. The enormous demands from Mesopotamia, East Africa, Egypt, and Palestine, as well as India, were met without resorting to the home authorities. The yearly average quantity of vaccines produced at the Central Research Institute, Kasauli, before the war was 18,500 c.cm.; during the war it rose to 2,500,000 c.cm., and included typhoid, cholera, pneumonia, and influenza vaccines. The same institute also equipped three laboratories, two of which were sent overseas. The Bombay Bacteriological Laboratory at Parel, while continuing its customary work of making plague vaccine, prepared one and a half million doses of vaccines for troops in India.

In spite of the deflection of energies to the war a considerable amount of research in various directions was carried on—by Major McCay, I.M.S., and his co-workers in Calcutta, on diabetes; by Lieut.-Colonel Greig, I.M.S., at Karachi, on cholera carriers; by Lieut.-Colonel McCarrison, I.M.S., on deficiency diseases; and by Lieut.-Colonel Clayton Lane, I.M.S., in Bengal and Dr. Mhaskar in Madras, on the incidence of ankylostomiasis.

Need for Education of the People.

General Edwards took ankylostomiasis as an illustration of the need for education of the masses. The parasite, he stated, affected to a greater or less extent the rural population of the whole of India; in many parts as large a proportion as 90 per cent. were infested. This debilitating disease, which rendered the sufferers unfit for hard work and an easy prey to other diseases, could be eradicated by the use of properly attended latrines. Again, the guinea-worm, propagated by minute water insects (cyclops) swallowed with drinking water, was a veritable scourge; it might be entirely avoided by straining all drinking water through a cloth as the Jains had learnt to do. Water might also be made safe by boiling. Speaking of malaria, he asked how many villagers knew that the disease could not be contracted except through the bite of an infected mosquito, and that the systematic use of mosquito nets and surface drainage would have an enormous effect on its incidence. Villagers ought to know also that typhus fever, which recently ravaged the United Provinces, was spread by lice and could be avoided by cleanliness, and that the germs of cholera, dysentery, and typhoid were derived solely from human excrement, and reached man either through foul drinking water or contaminated food or milk, usually by flies. He referred also to the fact that bubonic plague was disseminated by the infected rat-flea, and might be checked by keeping rats out of houses and grain stores.

Tropical Schools and Institutes of Medicine.

It was essential to have tropical schools in India where men could obtain training in medical research. Thanks to the energy of Sir Leonard Rogers, I.M.S., a school of tropical medicine, with a special hospital attached to it, would shortly be opened in Calcutta, and there was every prospect of another school of tropical medicine and medical research being opened shortly in Bombay, based on the Parel laboratory, and having a special hospital attached to it. Sir Dorab Tata, by a munificent gift of a lakh a year, had enabled the Bombay Government to proceed with the school, which would be well equipped and have a number of valuable scholarships, including travelling scholarships. In addition, it was necessary to have at least two institutes of medical research. He hoped to see an imperial institute, comprising a library and bureau of medical research, opened in Delhi, and another in Southern India. For the first, dependence was placed on the Government of India; as to the second, he had reason to believe that reliance could be placed on the munificence of the Tata family and other wealthy philanthropists of the Presidency of Bombay.

PROPOSED INDIAN INSTITUTE FOR MEDICAL RESEARCH.

The scheme referred to by General Edwards in the last sentence was initiated in a memorandum prepared about a year ago by Lieut.-Colonel Robert McCarrison, I.M.S.

In some introductory paragraphs he said that the introduction of the Western system of medicine was one of the greatest boons British rule had conferred on India, and its practice in India had already been the means of securing for mankind benefits of inestimable value. In India the practice of ophthalmology had attained its highest perfection; in India litholapaxy had its birth; in India the mosquito was shown to be the vector of malaria and the flea the vector of plague; in India methods of cure of the dysenteries and of cholera were devised; in India the prophylactic use of vaccines was inaugurated. These and many other notable achievements had secured for India a prominent place in the van of medical progress, but, as was to be expected from the evolutionary history of medicine in India, this honourable place had been won by others than her own sons. The time must shortly come when the major part of the burden and responsibility of maintaining and exalting this place amongst progressive nations would be borne by India's own men of science. The future of Western medicine in India depended not so much on this or that state service, as on the Indian people themselves and on the Indian medical profession. There were in every country many impediments to progress. The professional outlook was often too narrow, and the nations failed to recognize and utilize to the full the profession's enormous potentialities for good. The true ideal of every medical man should be to achieve mastery of his art, or some branch of it. Another hindrance to medical progress was a tendency to regard the acquisition of a medical degree or qualification as the high-water mark of endeavour, and an indication that further study was not needed. In India this tendency was aggravated by the paucity of facilities for post-graduate study, and a lack of opportunities for Indians to pursue the higher branches of medical knowledge.

An Appeal to Indians.

Lieut.-Colonel McCarrison then put forward a scheme, carefully worked out in detail, for the provision in India of greater facilities for higher medical education in such subjects as biochemistry, protozoology, and the other sciences correlated to medicine. India should not look only to the Government for a solution; in no country did a government provide so liberally for medical education and at such comparatively trifling cost to the individual. The additional facilities for which he asked should be provided by the people of India themselves. The Rockefeller Institute for Medical Research, established by the generosity of a single individual in America some years ago, was the most perfect organization in the world for the study of disease, and Japan afforded an example of the rapid growth of Western medicine in a country into which it was introduced much more recently than into India.

Lieut.-Colonel McCarrison then proposed the foundation by the people of India themselves of an Indian Institute for Medical Research on the lines of the Rockefeller Institute. Medical research held a high position among forms of human endeavour, and in the tropics especially was an essential preliminary to industrial advance; indeed, on it largely depended the success of commercial enterprise. Many industries in India were handicapped by the unrestrained ravages of disease—malaria, plague, ankylostomiasis, and leprosy. He then described the composite character of medical science to-day, and continued:

> The modern tendency exhibited in Western countries to isolate the various branches of medical knowledge into water-tight compartments and to separate them from the wide outlook of medicine as a whole is greatly to be deprecated. To attain the maximum of result there must be collected together into one institution masters of each subject, each fitting into his own place, and thus making smooth the running of the whole mechanism. Only in this way can the study of disease be satisfactorily and speedily carried out. It is necessary to establish a "company" or "team" of research workers for its

successful execution. In its efficient conduct medical research differs but little in principle, though it differs vastly in complexity, from the conduct of any constructive business enterprise—for example, that of mechanical engineering. Just as no single medical research worker can in his own person bring all that diversity of knowledge to bear on a difficult problem which is necessary for its complete elucidation, so no motor engineer is capable of constructing an automobile from the tyres to the engine complete in every detail. The firm of automobile manufacturers employs its designers, its engineers, its electricians, its carriage builders, its tire makers; these together, working under a directing head, produce the perfect whole. The director himself may be technically expert in no single branch of this work. His utility consists in his comprehensive, if general, grasp of the whole range of the processes of manufacture, and in his capacity for suggesting or devising improvements. So it is with the more complex mechanism of the human body. Workers who would study the derangements of this mechanism must include physiologists, pathologists, radiographers, bacteriologists, biochemists, and pharmacologists, the work of all being guided and directed to the perfect end by the imagination and capacity for original thought of a director. Just as in the battles of nations, so the battle against disease must be waged on a wide and comprehensive scale. The "sniper," however useful, cannot win the day; organization, generalship, and co-operation of all arms—these are the requisites of victory.

Research Institute Hospital.

A principle which, he urged, must be accepted at the outset was that the work of laboratories must not be separated from the clinical side of medicine. The research worker, under the scheme proposed, would first and foremost study the disease in the natural laboratory of the human body; consequently the proposed Indian Institute must comprise a large hospital. Such an institute should also afford opportunities for the examination of Eastern methods of therapy in the light of scientific truth. As an illustration of the application of the principle of combined laboratory and clinical study, he chose diabetes, and suggested that for a period the whole or part of the available hospital accommodation of the Institute might be set apart for the reception of cases of the disease from hospitals throughout India. The patients would be treated by the best methods known, and the conditions present would be studied by the physiologist, the radiographer, the bacteriologist, the biologist, and the pathologist. Epidemiological study would be of importance, not only in the infectious diseases, but also in those of the class to which diabetes belonged. An institute of medical research must include clinical, physiological, chemical, bacteriological, metabolic, protozoological, radiographic, histopathological, entomological, and epidemiological investigations, conducted under the direction of one chief of the staff.

Staff of the Institute.

The director in chief should be a physician of high standing and wide culture, having a broad grasp of the whole range of medicine, of vivid imagination, endowed with originality and capable of directing wisely the scientific activities of his staff. At the head of each department should be a director of high repute, and it was essential that no mistake should be made at the beginning in this direction. The director of each department would direct the scientific inquiries in it, facilitate the studies of scholars and research workers, and act as expert adviser of research workers from any part of India. The director in chief and the directors of departments would form a scientific council to determine the scope and character of researches, to collate the results obtained, to estimate the suitability of independent research workers, to appoint scholars and fellows, and to arrange for yearly courses of lectures open to all graduates of medicine, and for the publication of scientific reports.

Scholarships and Fellowships.

Lieut.-Colonel McCarrison hoped that in this way the Institute would so educate Indian-born medical men in all the higher branches of medical science that within a term of years, say fifteen to twenty, the higher appointments and the direction of departments might be held by Indian medical men. The endowment of the Institute should provide for scholarships to be offered for competition amongst Indian-born graduates of medicine of either sex. The length of time for which a scholar should hold office would be determined in each case by the scientific council, with a maximum of three years. If a scholar did not disclose capacity for research, he might yet be permitted to retain his scholarship long enough to enable him to follow his particular subject with the view of becoming a specialist in general or consulting practice. From among the scholars selections would be made for fellowships tenable for three years; if these showed capacity for original work, they would then become eligible for the appointment of assistant director when a vacancy occurred. The Institute would also afford laboratory facilities to a limited number of research workers, neither scholars nor fellows, who were pursuing independent investigations.

In this way young physicians, who aspired to consultant or superior class practice, would find facilities for acquiring that experience and additional education requisite for the highest class of professional work. Three years as a scholar at the Institute and three years as a fellow would give the holder a status and experience which he could not otherwise acquire even in Great Britain. Under this system the young physician would become subject to the discipline of science, would learn to appreciate the difficulties of all scientific pursuits and the "fallibility of the faculties upon which he depends" (Osler).

Organization.

In giving details of the way in which these principles should be applied Lieut.-Colonel McCarrison wrote as follows:

The Department of Clinical Research should include a hospital divided into five wards of twenty beds each. The hospital staff should include scholars or fellows acting as house-physicians for these wards. These appointments should be open, by competition, to graduates of Indian universities, both men and women, the tenure of the appointment being six months to three years as for scholars in other departments of the Institute. During the tenure of the appointment the house-physician would be called upon to assist for a given period in each of the departmental laboratories of the Institute. He or she would in this way acquire a sound and highly practical knowledge of epidemiology, helminthology, bacteriology, protozoology, etc., which would prove of the utmost benefit in the practice of his or her profession on leaving the Institute.

I propose also that the staff should include a chief physician as head of the departments of Clinical Research and Epidemiology, and a second physician who will be in charge of the treatment of patients, and assistant director of these departments. It is hoped that these two appointments may ultimately be filled by selection from amongst the most brilliant of former house-physicians.

The scheme included the provision of an adequate library.

It was suggested that the Institute should be established in a healthy, equitable and bracing climate, with good railway communications, and that it should comprise the following six departments:

Research Departments.

1. *Epidemiology* (included with the Department of Clinical Research).
2. *Physiology*, including *Physiological Chemistry* and *Calorimetry*, and *Dietetics*.
3. *Pathology*, including *Morbid Anatomy*, *Helminthology*, and *Bacteriology*.
4. *Protozoology*, including *Entomology*.
5. *Experimental Pharmacology*, including *Biochemistry*.
6. *Radiography*, *Electro-therapeutics*, and *Photography* (including microphotography).

The departmental laboratories should be situated in separate blocks or wings for each department, arranged in parallel and be readily accessible from the hospital wards. They should be designed on the most modern principles, and equipped in accordance with the most modern standards. Provision should also be made in the plans of the Institute for the addition of such other departments as the progress of medicine may render necessary.

The hospital should consist of five single-storied wards, each with an area of 2,500 square feet, to be utilized as might be found most convenient for the work at the moment in hand. Each ward should contain twenty beds, giving an area of 125 square feet per bed. If found desirable, any required number of special wards could be formed for paying patients, with light reinforced concrete partitions. Such temporary divisions could easily be made also if required for any particular disease under investigation or for caste purposes. Each ward should be provided with its own bathrooms and lavatory accommodation and be built and equipped in accordance with the most approved principles of modern construction.

An operating theatre with the necessary rooms should be provided in a separate block. The administrative

block would provide offices for the staff of the clinical research department, with male and female waiting rooms.

Finance.

Lieut.-Colonel McCarrison gave detailed estimates of the cost of erecting and maintaining such an institute, and proposed that the director in chief should receive 3,000 rupees a month and the directors of departments from 1,500 to 2,000 rupees a month; the assistant director in each department should begin with 500 rupees and rise by annual increments of 50 rupees to 1,000, with in each case a bungalow or quarters. Fellows, he suggested, should receive 400 rupees a month and scholars 200 rupees, in both cases with free quarters. The final estimate for cost of erection and equipment was £150,000, and for the annual recurring cost of maintenance £40,000; this would involve a foundation fund of £800,000 and a building fund of £150,000. Allowing for unforeseen expenditure the total sum required was estimated to be one million sterling.

Scotland.

ROYAL COLLEGE OF PHYSICIANS.

THE Morison Lectures before the Royal College of Physicians of Edinburgh will be given next week by Lieut.-Colonel A. Ninian Bruce, M.D., D.Sc., F.R.C.P.Edin., R.A.M.C. The subject is the functional nervous diseases of the war. The first lecture, on June 2nd, will deal with conversion hysteria and discuss its prevention, development, and treatment, and the psychic origin of functional paralysis. In the second lecture, on June 4th, anxiety states will be considered, and the significance of repression and dissociation discussed. The third lecture, on June 6th, will deal with mental states, and include the discussion of borderline states produced by the war and a comparison of war psychoneuroses with those of civilian life. The lectures will be delivered in the hall of the College at 5 p.m. on each day.

TREATMENT FOR HYDROPHOBIA.

No case of rabies has yet been reported in Scotland, but the Local Government Board is making arrangements by which persons bitten by animals affected with rabies or suspected rabies will be treated by Professor Ritchie at the Royal College of Physicians' Laboratory, 2, Forrest Road, Edinburgh. Until the arrangements therein are complete any Scottish case will be sent to Dr. Dudgeon at St. Thomas's Hospital. If a medical practitioner is satisfied that antirabic treatment is essential for any case, and the person bitten agrees, a telegram should be sent to Dr. Dudgeon at St. Thomas's Hospital, Westminster Bridge, London, S.E.1.

EDINBURGH ROYAL MATERNITY HOSPITAL.

The report presented to the annual meeting of the Edinburgh Royal Maternity and Simpson Memorial Hospital on May 19th, when Mrs. Chalmers Watson, M.D., C.B.E., was in the chair, brought out the fact that only in one previous year (1911) had the numbers of patients attended through the hospital been larger; but there was a difference in respect of the number of in-patients, who in 1918 were 846 as against 591 in 1911, a circumstance which proved the growing tendency of married women to seek the help the hospital offered. In the outdoor department 569 patients had been attended in their own homes, and 521 at the Leith branch. The total for the year was 1,936. In addition to these cases of delivery 947 expectant mothers had been seen at the antenatal clinic under Dr. Ballantyne's care, of whom no fewer than 478 were new cases. Mrs. Chalmers Watson, in moving the adoption of the report, Councillor Young, the chairman of the health committee of the town council, and Professor Lorrain Smith, dean of the faculty of medicine in the university, all referred to the important part which the hospital was playing in the carrying out of the Corporation of Edinburgh's maternity service and child welfare scheme, and would play in the new scheme for dealing with venereal disease as it affected pregnant women and their infants in Edinburgh, Leith, and the Lothians. On account of the increased number of women making use of the hospital, and of the part the institution was fulfilling in the city's welfare schemes, the task of building a larger and up-to-date hospital was pressing upon the directors, and the opinion was expressed that a war memorial in Edinburgh could take no more fitting form. Mrs. Chalmers Watson made the interesting and eminently practical suggestion that in the case of primiparous women their stay in the hospital should be lengthened to one month subsequent to delivery, and that during these extra two weeks they should receive instruction in the care and feeding of their infants, and be told of the commoner ailments of children and their simple remedies. She also expressed the hope that before long the directors would be able to complete the necessary arrangements for the occasional appointment of a woman doctor as a resident medical officer in the hospital.

England and Wales.

BUBONIC PLAGUE AT LIVERPOOL.

THE Secretary of the Local Government Board has issued the following statement:

A soldier passenger on board the ss. *City of Sparta*, which left Bombay on April 3rd, was taken ill during the voyage and died of bubonic plague. He was buried at sea. The vessel on arrival at Liverpool on April 29th was treated as a suspected ship and diverted to the mooring station, where all the usual precautions were adopted; portions of the ship were fumigated with sulphurous acid gas, and subsequently sprayed with petroleum emulsion. The Local Government Board have now received an intimation that a native member of the crew fell ill and was removed to the Liverpool Port Sanitary Hospital on May 13th. He developed a bubo on May 16th, and died next day. The illness was diagnosed as plague, and this diagnosis has been verified by bacteriological examination. The Local Government Board are making further inquiry in regard to this case through one of their medical inspectors.

MENTAL DEFICIENCY FROM THE PREVENTIVE ASPECT.

Under the above title Dr. Meredith Young has recently issued an eight-page pamphlet, apparently of the nature of a report to the Medical Deficiency Act Committee of the Cheshire County Council, to which he is medical adviser. Succinctly gathering up under seventeen heads the causative factors to which mental deficiency has been attributed, he considers particularly the physical conditions so frequently found associated with mental defect, as in cases of microcephaly of antenatal toxic origin, of lobar sclerosis, hydrocephaly, acute anterior poliomyelitis, and certain forms of encephalitis and meningitis due to bacterial infection of various kinds. He proceeds to point out how helpful an efficient maternity and child welfare scheme may be in the prevention of mental deficiency, and lays stress on the importance of medical and other workers in such clinics being thoroughly acquainted with its earliest manifestations. To this end he suggests that in every large town there should be a well-equipped psychiatric clinic where young defectives could be studied. The knowledge thus gained, both of children and parents, would become a valuable accessory to preventive treatment, especially in the promotion of improved environmental conditions. The key to the preventive problem lies, however, in the recognition of heredity as the preponderating factor in the production of mental defect, and Dr. Young insists on the importance of the absolute prohibition of the marriage of all persons recognized as mentally defective, and strongly advocates compulsory sterilization in spite of sentimental opposition here, and even constitutional objections such as have been held in America to invalidate legislation on the subject by individual States. As regards compulsory segregation, now authorized under the Mental Deficiency Act in certain cases, Dr. Young condemns the parsimonious inaction of many local authorities in this matter, and also in neglecting the prescribed census of mental defectives in their districts; and he advocates duly remunerated notification by medical practitioners of cases coming under their notice which call for action by the local authority.

Dr. Meredith Young's pamphlet is opportune in view of the need of stimulating public authorities to carry out more efficiently their duties under the Mental Deficiency Act which came into operation over five years ago, but owing to the strain of the war has so far been but very imperfectly administered. It is not true economy to defer the expenditure of funds which, wisely laid out, might be expected to diminish in the near future the burden entailed by feeble-mindedness on the community—a burden likely to increase in geometrical ratio so long as any available means for its elimination is withheld.

RESETTLEMENT OF NURSES.

At the present time there are many nurses needing employment who were fully trained sisters or nurses before the war. Many gave up good civilian appointments in order to nurse the wounded. Now that the fighting is over and the hospitals and nursing homes are filling up their staffs again, it is their duty to fill vacancies from among the women who have risked and suffered much to serve their country. The Ministry of Labour has set up a Nurses' Demobilization and Resettlement Committee, which is prepared to give institutions all information as to demobilized nurses seeking employment. The Committee undertakes to supply at once women whose training has fitted them for responsible posts, and whose services have given them a claim on the consideration of their countrymen. Applications should be made to the Secretary of the Committee, 16, Curzon Street, Mayfair, W.1. When demobilization is complete it is estimated that there will be 3,000 trained sisters and nurses desiring work. The Committee is prepared to act as an intermediary between them and the hospitals, nursing homes, and public institutions whose staffs have been depleted by the war. As announced in our issue of May 17th, the Minister of Labour has appointed a subcommittee for Scotland of the Nurses' Demobilization and Resettlement Committee to deal with the resettlement of Scottish nurses in civil life, with special reference to those who desire to find post-war employment or undertake some form of training.

Correspondence.

VOLUNTARY HOSPITALS.

SIR,—The air is full of reforms—many good, some indifferent, and not a few bad—and not least amongst these reforms is the reorganization of the medical service in this country. That such a reorganization is desirable is recognized by the medical profession not less than by the Government, though it is to be feared that the latter do not view the matter entirely from the same standpoint as the former. One of the chief reasons for this movement is the great advance in medical science during recent years and the highly complex and specialized treatment resulting; often, to quote the words of another, requiring "team work in specially equipped institutions." And it seems only fair that this should be available to all, rich and poor alike.

How do our voluntarily supported hospitals meet this situation? To begin with, most of them are in straitened financial circumstances, nor is this condition likely to improve having regard to increased taxation and other burdens imposed on those who hitherto have supported them. They minister to the needs of paupers, those of moderate means with an income above a certain limit being looked upon, and rightly so under present conditions, with disfavour. The members of this very large class are indeed in an unenviable position. Suppose the necessity for a severe operation should arise. They cannot afford an expensive nursing home and the fee which a surgeon would be compelled to charge outside of an institution, though they are willing and able to pay moderate fees to both hospital and operator. What happens? They are either smuggled into the hospital and maintained at its expense in a public ward—which, though perfectly good, lacks those refinements to which they should be entitled—or they pass to the nursing home, thereby incurring expenses which cripple them for many a long day. Either way injustice is done. Again, increasing numbers of the labouring classes are now in receipt of wages which can hardly be said to qualify them as paupers. Are they to be admitted absolutely free to institutions supported by voluntary contributions? I do not think that they themselves desire it, and, on the face of it, it is obviously wrong.

What are the remedies? One is free hospital treatment for all, under Government control with paid staffs. I commend this to those who have had experience of departmental bureaucracies during the war. Another—and to my mind a better—is the admission to our hospitals of paying patients with fees graduated according to their means. Under this scheme pauper cases would be treated gratuitously; for those whose income exceeded a certain fixed limit a sliding scale would be in operation according to the accommodation supplied—ranging, say, from 30s. to £2 a week in an open ward up through cubicles at three or four guineas to the more expensive private rooms. The medical staff would be allowed to charge fees to the paying patients, on a graduated scale laid down by the hospital authorities. In this way hospital abuse would be abolished; managing boards would be able to prove to the Government that their institutions were largely self-supporting and on a much firmer financial basis than when wholly dependent on charity; voluntary subscriptions should be the more readily obtainable since the benefactors would know that their gifts were entirely devoted to the absolute poor; and all, rich and poor alike, would have institutional treatment at their command.

I have lately taken the trouble to write to certain representative American hospitals on this subject, and have received some most instructive replies. Nearly all take paying patients, and nearly all derive a very considerable part of their income from so doing. Some have only recently adopted the scheme, but they all agree that it is one which is growing in popularity. To take a few examples:

The Jefferson Hospital, Philadelphia, in 1918 received 3,052 fully paying patients, 1,610 partially paying, and 4,662 free. Its income was made up in round figures thus: From working of hospital (chiefly fees from patients) 240,000 dollars, from bequests and investments 28,000 dollars, and by grant from State of Pennsylvania 99,000 dollars.

The Lakeside Hospital, Cleveland, in another year had 1,263 fully paying patients, 2,844 partially paying, and 1,658 free. Its income derived from operating the hospital was 198,000 dollars, as against 7,000 dollars from voluntary contributions and 100,000 dollars from investments and endowments.

The Johns Hopkins Hospital at Baltimore in 1917 drew no less than 576,000 dollars from hospital receipts, a very large proportion of its total expenses, which were 714,000 dollars.

Similar figures are given by other institutions.

It is good to see ourselves as others see us, and, in conclusion, I should like to quote from the letter which I received from the Superintendent of the Lakeside Hospital, Cleveland. He says:

From the standpoint of an American, English hospitals appear hampered by your traditions, which have kept down the development of hospital work and the development of institutions, owing to the fact that your hospitals are for paupers only. It seems to us that this has resulted in the maintenance of lower levels of scientific and general efficiency in the institutions. At any rate, we like our fundamental principle much better—that is, that the very best and the most effective hospital service shall be available to every person when in need of it, and that the payment therefor shall be made according to means.

—I am, etc.,

Reading, May 18th. W. BERNARD SECRETAN.

THE TREATMENT OF THE NEURASTHENIC PENSIONER.

SIR,—No one who has had much to do with the examination of soldiers who have been invalided suffering from neurasthenia can maintain that the present state of matters is satisfactory. Very many come up for re-examination after an interval of some months, and it is found that their condition has in no way improved; they would appear to be drifting into a fixed and chronic state. The immediate functional physical symptoms have passed away, but there remains a morbid state of mind which is most intractable. That this is so has been recognized by the authorities, and I understand that it is proposed to establish special hospitals in different areas for the treatment of these cases. From my personal observation I am not convinced that such hospitals are necessary, nor am I convinced that hospital treatment is the best in the

majority of the cases; and before the authorities embark on this scheme I would suggest an alternative method which might be given a trial. Briefly stated, it is as follows: That there should be appointed in different areas a staff of physicians who are familiar with the treatment of these war neuroses, and that the pensioners should be treated privately. This could be done either by domiciliary visits, or by the pensioner visiting the physician in his consulting room. The important point is that he should be seen by the physician in surroundings which in no way suggest army conditions, that his mental symptoms should be analysed, and his condition made clear to him. A few visits and conversations at intervals of a week or two would do much to restore the pensioner's confidence in himself and hasten his recovery. After all, a great many come from comfortable homes—it is not their environment which prevents their getting better. Most of the pensioners I have questioned are strongly averse to returning to a hospital, and unless these cases go willingly the difficulty of their treatment is much increased.

Six months have now passed since the armistice—the type of disorder is approaching more closely the type of neurasthenia one was accustomed to meet with in the civilian. It is possible to cure the civilian at his home, and while he continues to do his work, modified a little, and it should not be impossible to cure the soldier.—I am, etc.,

Bristol, May 20th. JAMES M. RUTHERFORD.

HYPNOSIS, SUGGESTION, AND DISSOCIATION.

SIR,—Let me say, in reply to Dr. Mercier's last letter, that my views on the value of light hypnosis are based on work done, not in the deeps of King's College psychological laboratory, but in hospitals in the field in France and elsewhere during the past four and a half years. Having investigated and treated nearly 5,000 cases of psycho-neurosis during this time, I feel that I have some right to an expression of my own views on the subject.

I have found that in *early* cases of war neurosis showing loss of memory for the incident and other functional symptoms, the reinstatement of these memories under light hypnosis, in such a way that the accompanying emotion of fear is again aroused with hallucinatory vividness, causes the disappearance or amelioration of the other symptoms. Suggestion plays no part in this dispersal of symptoms, although it is, of course, involved in the preliminary process of inducing the hypnosis.

More chronic cases of psychoneurosis do not respond in quite the same way. On these and other observed facts I have based a theory and a therapeutic method which do add something new to the doctrine of dissociation and hypnosis, and which I hope to explain in a forthcoming article in your JOURNAL.

Sir Robert Armstrong-Jones does good service in distinguishing the neuroses from the psychoses as regards reaction to hypnosis. I am not of those who tend to regard hypnotic suggestion as a panacea for mental ills. Light hypnosis is needed in only a very small minority of nerve cases, and in them should be used sparingly.—I am, etc.,

WILLIAM BROWN.

Psychological Laboratory,
King's College, May 20th.

DISAPPOINTMENTS AFTER GASTRO-ENTEROSTOMY.

SIR,—From what I myself have seen, I have no hesitation in saying that many gastro-enterostomies are done when no definite diagnosis has been made. During the past eighteen months I have seen three cases where gastro-enterostomy had been performed when the symptoms had been due to lesions of abdominal organs other than the stomach or duodenum. The first was a case of advanced atrophic cirrhosis of the liver, the second of extreme retroflexion of the uterus with a chronic appendicitis, and the third an ovarian cyst the size of a Jaffa orange, a subperitoneal myoma of the uterus, and haematosalpinx.

The second case had had gastro-enterostomy done with no benefit and two subsequent operations for adhesions. When she came into my hands *x*-ray investigation showed evidence of a junction ulcer, and no barium would enter the appendix. Bimanual vaginal examination revealed extreme retroflexion of the uterus.

I did transgastric excision of the junction ulcer, and subsequently removed the appendix and performed a ventro-suspension. She is now in good health after four years of suffering.

Dr. Hutchison, in summing up, advises that great care should be taken in selecting cases for gastro-enterostomy, and that a physician should be consulted as well as a surgeon. I would go still further, and suggest that no patient be subjected to gastro-enterostomy until he has been thoroughly *x*-rayed by an expert radiographer. This is the only sure means of eliminating the possibility of a hypotonic or atonic stomach or gastroptosis. Since I have followed this course, thanks to the advice given me by Dr. Spriggs of Duff House, I have seen nothing but good follow my gastro-enterostomies.

Many surgeons in big centres have not the facilities for following up their cases and profiting by their mistakes, but when a surgeon is practising in a district like mine his results have got to be good or he gets no more work.

The Mayo type of gastro-enterostomy gives, in my opinion, the most satisfactory results, and I am sure that fourteen-day catgut is far preferable to either silk or linen for the inner layer of sutures.

The early giving of solid food has no advantage, and is positively dangerous. Why not treat gastro-enterostomy like a recently bleeding ulcer and keep the patient on a Lenhartz diet?

There is not enough co-operation between surgeon and physician in the handling of stomach cases. Many cases undergo unnecessary operations, but there are almost quite as many cases which ought to be operated on and are not touched till too late. Surely, with all the lessons learnt during the late war of the value of team work, we may hope to see some real progress made for the benefit of the middle classes who at present are neither in the hospital class of patients nor among the wealthy, both of which classes can depend upon getting thorough investigation before being submitted to operation.—I am, etc.,

Banff, May 12th. W. MANSON FERGUSSON.

THE ETIOLOGY OF AORTIC REGURGITATION.

SIR,—To those who have had experience in the *post-mortem* room it may appear that in the careful analysis of cases of aortic regurgitation occurring in recruits Dr. Russell Wells and his colleagues have laid too great stress upon the teaching of textbooks regarding the morbid anatomy of cardiac diseases. Morbid anatomists will probably agree that there is no evidence that diphtheria, scarlet fever, or pneumonia cause endocarditis, and gonorrhoea—if ever responsible for such disease—is so only for the malignant form. Neither does syphilis directly attack the aortic valve as an endocarditis. Its influence in producing aortic regurgitation is indirect through the medium of the aorta. Not, however, through the more superficial forms of disease of the artery, which generally go by the name of atheroma. The deeply invading, much less calcareous, and more fibroid form of disease of the aorta, which appears generally to be due to syphilis, frequently extends to the aortic valve, especially when the distribution of the disease is limited—as it often is—to the intrapericardial portion of the arch of the aorta. The resulting fibroid lesion of the aortic valve contracts the cusps and leads to virtually uncomplicated regurgitation—that is to say, there is no associated stenosis. Stenosis of the aortic valve—a disease in which there are marked calcareous changes in the cusps—is scarcely ever associated with disease of the aorta. The writers of this paper ask "What is the cause of atheroma?" There are probably several causes, but apparently the cause of calcareous disease of the aortic valve is quite distinct from the causes of atheroma.

It cannot be said that there is any evidence in the *post-mortem* room that strain causes valvular disease. Retroversion of a cusp of an aortic valve may occur as the result of strain, but the cusp must be diseased first. The belly of the cusp must have been almost obliterated by fibroid contraction, as a consequence of, it may be, the fibroid form of valvular disease which spreads from the aorta. In one case which I met with the retroversion of the cusp occurred in a travelling acrobat, and had apparently taken place while a somersault was being performed in the

air. When the cusp is softened rupture may occur. The chronic form of disease which leads to rupture, like that which may result in retroversion of a cusp, is the disease which spreads from the aorta to the valve—in other words, is the syphilitic form.

As a morbid anatomist, I concur in the opinion that rheumatism has certainly been the cause of aortic regurgitation in the great majority of instances met with before the age of 40. After the age of 40, cases of death from aortic regurgitation due to rheumatism are rare. Virtually all fatal cases are found to be associated with fibroid disease of the aorta—in other words, are syphilitic.

It should, perhaps, be mentioned that in diseases such as diphtheria, even in children under two years of age, there may not only be scattered patches of disease of the arteries, including the aorta, mainly of the inner coat, but also similar patches in the valves—either the mitral or aortic. Possibly disease of this nature has been called endocarditis, and the statement that diphtheria, scarlet fever, etc., may be causes of endocarditis, copied from textbook to textbook. These small patches may become calcified into very thin calcareous plaques, but there is no indication that they ever hamper the affected valve.—I am, etc.,

Norwich, May 12th. THEODORE FISHER.

INSURANCE: A FRESH START?

SIR,—The reason why the thought arises in Dr. Hodgson's mind (p. 658) that the report of the Insurance Acts Committee is "an attempt at keeping alive a service that is wrong, in principle, from its foundations," is that he apparently is still content to be paid only for curing his patients, and does not realize that his efforts and advice, which tend to prevent or shorten their illnesses, go unremunerated. "Prevention is better than cure"—this is the principle underlying M.25, and any system of payment by capitation. "Cure is better than prevention" can be the only principle that urges men to ask for payment on an attendance basis.

Granted an *adequate* capitation fee, surely the profession must soon realize that with the modern trend of preventive medicine an agitation to return to payment by attendance would be a suicidal policy.

Let me shortly explain my point by an example. During the influenza epidemic all my acute cases were treated with vaccines, insured and private patients alike. I am satisfied that by so doing I diminished by about one-half the number of visits I should otherwise have had to pay.

On my insured patients, paid for on a capitation basis, I gained. On my private patients, paid for on the antiquated attendance basis, I lost heavily.

I am convinced that the right policy for the profession is to look more favourably upon possible extensions of insurance practice, always granted that the capitation fees are adequate.—I am, etc.,

Melksham, Wilts, May 25th. T. WOOD LOCKET.

SIR,—Dr. Stanley Hodgson in his letter under this heading makes several statements that are at least open to challenge. He assumes, which is not true, that adequate return for work done can only be obtained by a "per attendance" payment. He asserts that the amount of services required is governed by no known law, making no allowance for the working of averages. His simile of the battery of field artillery is imperfect. If the whole field artillery of a known average number of guns at risk (that is, at the war) were included and the risk undertaken for a period of years instead of six months it would be quite possible to estimate the average number of shells required per gun per annum and to fix a price per gun for the shells required. A great majority of practitioners are satisfied that the capitation method of payment works quite fairly and is satisfactory, but there are still many who would prefer the payment "per attendance" if payment were made in full.

A great service would be rendered to the profession by any one who could devise a scheme that is reasonably simple and practicable which will provide for payment "per attendance" and be not open to exploitation by the unscrupulous when the payment is being made by a third party and not by the patient. It is not sufficient to set up machinery to deal with the unscrupulous; exploitation would have to be prevented. With such a scheme a Government could undertake to pay in full. So far no such scheme has been put forward, and even when it is many of us will still prefer payment on the capitation basis as being fair and simple.—I am, etc.,

Birmingham, May 26th. H. G. DAIN.

THE LAST COMPLAINT OF THE SPECIAL RESERVE.

SIR,—I feel sure you will welcome the last complaint of the Special Reserve. I have at sundry times burdened your columns with figures illustrative of the preferential treatment accorded to temporary officers. The complete figures show that I am about £300 out of pocket by being so foolish as to train for an emergency before the emergency arose. It will be well known to you that Government departments care for none of these things. Since my return to civil life I have been told that I "had to go," with the inference that there could be no credit to me in going so early. May I correct this error for those of your readers who may share it?

The Special Reserve was raised and trained for a definite purpose, namely, to form part of the Expeditionary Force. Nor was there any doubt as to where that force was most likely to be used—it was well known that it was likely to be used as a defensive measure against a Continental power at no distant date. This was in 1909. We joined that force of our own free will, after its purpose had been explained to us by an emissary of the War Office. We could well see what havoc it might play, as it has played, with our private interests. I submit that we are entitled to more credit than those who came later at their own convenience for short periods only. *Bis dat qui cito dat* was truer than ever in August, 1914.

My final complaint is with regard to my status, now that we are demobilized, compared with that of a temporary officer of thirteen months' service. I have nearly ten years' service, and may get my majority if the Special Reserve is in being another two years (which seems unlikely). The temporary officer with the higher pay and less service is also a captain. I have served under at least one temporary officer of less than one year's service who had been promoted major already, as officer in charge of a medical division, although he was not even a practitioner of medicine, but an M.O.H. No doubt he retired as a major.

We have been told often enough that we get the same pay as regulars (which of course is not the case) and that we are entitled to the same promotion. But the regular captain has had accelerated promotion, while this has not been granted to the Special Reserve.

I suggest to the authorities that as (1) we have been paid less than promised; (2) have suffered more than even the Territorials, although these went out very early—such as wished to, and they were very many; (3) have been stated by a Government-appointed Commission to be suffering from an unjustifiable anomaly; and (4) now find ourselves junior to those who have done less and received more—that all those who were captains in the Special Reserve in August, 1914, should forthwith receive accelerated promotion to the rank of major. The promotion could date from the day after demobilization, for if it dated before it might entail a bigger gratuity, which I am sure the Government would regret.

This concession would entail no public expenditure, and none above the rank of staff lieutenant need be seriously disturbed by the necessary clerical work.—I am, etc.,

May 20th. GORDON WARD, M.D., G.P.

A TUBERCULOSIS SERVICE.

SIR,—In your issue of May 24th, p. 657, Dr. Halliday Sutherland writes of the "clinical prevention of tuberculosis" as something in addition to diagnosis and treatment, and apparently under "clinical prevention" he would place home visitation and after-care work. He appears to advocate, mainly on the grounds that home visitations are "essentially clinical" duties, that tuberculosis health visitors and nurses should be entirely under

the direction of the tuberculosis medical officer. But even if we agreed with him in principle this rearrangement could not be made general, because the special tuberculosis health visitors and nurses are generally the luxury only of the boroughs and of some county councils. In a great part of Great Britain the health visitor and nurse who do tuberculosis work also perform child welfare work, and discharge other duties which lie quite beyond the sphere of operation of the tuberculosis medical officer.

Dr. Sutherland also considers that the tuberculosis medical officer should report and give advice, direct, to the sanitary authority; but surely the advantages of one chief administrative medical officer, who works in close co-operation with medical colleagues whose official duties are mainly clinical, and who directs and advises upon the whole field of public health activities, are so great that no change is likely to take place. The Society of Medical Officers of Health has many members who are tuberculosis medical officers, and the society is desirous of promoting their interests in every possible way; but it does not believe that either their interest or those of the public health would be served by the adoption of Dr. Sutherland's policy.—I am, etc.,

HENRY KENWOOD,
President of the Society of Medical Officers of Health.
London, May 27th.

Obituary.

FRANCIS JAFFREY, F.R.C.S.,
Consulting Surgeon St. George's Hospital, London.

The news of the death of Francis Jaffrey, at Fowey, on May 20th, will come as a shock to a large circle of friends, for, although he was forced by ill health to retire from practice in London in 1914, he had recovered sufficiently to undertake the duties of honorary secretary to the Fowey Cottage Hospital and surgeon to the Fowey Auxiliary Hospital for Wounded Officers.

Jaffrey was the son of the late Archibald Jaffrey of Adelaide, and was born on February 6th, 1861. He received his education at St. Peter's College, Adelaide, where C. E. Todd, who died last year, and Sir Edward C. Stirling, whose death occurred in March last, were also educated. The fact that these two Australians had entered at St. George's Hospital may possibly have influenced Jaffrey in his choice of a medical school. He took to medicine rather later in life than is usual, having started his career in the city. He entered St. George's in 1885, and while a student was given to athletics: he was captain of the Hospital Rugby Football XV in 1888, and also helped St. George's to secure the Lawn Tennis Cup on at least two occasions. He took the diplomas of the Conjoint Board qualification in 1890. He was house-surgeon in 1891, and in the following year accepted the post of R.M.O. to the Atkinson Morley Convalescent Hospital at Wimbledon. Returning to St. George's in 1897, he was surgical registrar and demonstrator of anatomy, and in that year became F.R.C.S.Eng. He was appointed assistant surgeon to St. George's Hospital in 1898 on the retirement of Mr. Pick, became surgeon in 1905, and consulting surgeon in 1915. Another institution to which he was attached was the Belgrave Hospital for Children, and for some years he was consulting surgeon to the Cripples' Home in Kensington. In the early years of the present century Jaffrey acted as dean of the Medical School of St. George's Hospital, conjointly with Dr. Arthur Latham, while he was also for a time Lecturer on Anatomy.

It would not be right to term Francis Jaffrey a great surgeon, but he was a most efficient hospital officer, and his cases did remarkably well. Regular and punctual in his attendance, careful in his work; as an operator, sound rather than brilliant, absolutely loyal to his colleagues both on the senior staff and also to his house-surgeons, Jaffrey was an ideal man to work with. The writer of these lines was appointed Jaffrey's house-surgeon in 1906, and he can never forget the happy six months that he spent in that office. His death leaves a gap not easily to be filled.

CLIFFORD LUXMORE DREW, M.B., C.M.ABERD.,
Coroner for the Western Division of London.

MR. LUXMORE DREW, Coroner for the Western Division of London, died suddenly on May 26th. When, some years ago, the London County Council took over the appointment of the London coroners, it wisely decided that all future holders of the post should be possessed of both medical and legal qualifications. Mr. Drew, who was a barrister as well as a doctor, was the first coroner so appointed, and his appointment fully proved the wisdom of the County Council in selecting him. When first appointed (in 1892) he succeeded to the district—a rather restricted one—of the late Mr. Diplock; but when, some time later, the districts were rearranged, he was induced to add to his labours, and at the time of his death held courts in no fewer than five large London parishes—Chelsea, Fulham, Hammersmith, Kensington, and Paddington. This heavy work naturally told upon a constitution none too strong, so that, notwithstanding the loyal co-operation of his two deputies, Mr. Douglas Cowburn and Mr. Peter Byrne, he latterly showed signs of constitutional breakdown. On the morning of May 26th, while dressing, he felt a sense of suffocation, went to his wife to complain of it and fell dead, after vomiting about a pint of blood.

Clifford Luxmore Drew was the son of Mr. Charles Drew who held a commission upon the Madras Establishment of the Honourable East India Company, and was with his parents in India during the Mutiny. Upon returning to this country he received his preliminary education from private tutors, and in 1870 entered the London Hospital. After taking the diploma of M.R.C.S. in 1874 he went to Aberdeen, where he graduated M.B. and C.M. in 1876. He never engaged to any extent in private practice, and with a view of becoming a coroner entered the Middle Temple and was called to the Bar in 1890. At first he travelled the Western Circuit, and also took cases at the Old Bailey, but in 1892, on being appointed coroner, this work monopolized the whole of his time. He was much devoted to gunnery and had been captain and instructor of artillery in a brigade of the Royal Artillery. As a result of his experience he published, in 1888, a little manual entitled *Through the Woolwich Courses*.

Mr. Drew was a keen sportsman, and never missed an opportunity of hunting with the hounds in Devonshire or salmon fishing in Scotland. He was a man of amiable and kindly disposition, who found his chief relaxation in his well-stocked library, the walls of which, like other walls in his house, in addition to books, were covered with trophies of the chase.

Mr. Drew, who married in 1880 the daughter of the late Mr. William Yeo of Appledore, leaves a daughter (wife of Captain S. C. Robertson).

The first part of the funeral service was conducted at St. Peter's Church, Bayswater, the body being subsequently conveyed to Brighton for interment in the family grave at Hove.

JOSEPH WIGLESWORTH, M.D., F.R.C.P.,
Late President of the Medico-Psychological Association.

WE regret to record the death of Dr. Joseph Wiglesworth, formerly president of the Medico-Psychological Association and lecturer on mental diseases in the University of Liverpool, and for thirty years medical superintendent of Rainhill County Asylum, near Liverpool. Dr. Wiglesworth was born in 1854, and studied medicine at Liverpool and St. Thomas's Hospital. He obtained the M.R.C.S. diploma in 1876, and graduated M.B.Lond., with first class honours in medicine and obstetric medicine, in 1878, proceeding M.D. two years later. In 1888 he became a Member, and ten years later was elected a Fellow of the Royal College of Physicians of London.

Dr. Wiglesworth was an ardent ornithologist, and became a recognized authority on the bird life of Somerset, upon which subject he wrote a number of papers. He was a member of the British Ornithologists' Union, and president and recorder of the Ornithological Section of the Somerset Archaeological and Natural History Society. In addition to many papers on the pathology of mental disease, including his presidential address in 1903 on heredity and insanity, he was the author of *St. Kilda and its Birds*. His published work on mental pathology, much of which appeared in the *Journal of Mental Science*, has

nowadays, perhaps, lost the significance it had, for most of it was written prior to the time when the relationship of syphilis to all tabetic disease was realized, and before the modern, if unproved, theory was advanced that the pathology or genesis of delusion, and even of paranoia, may be revealed by analytical methods of examination.

About fifteen years ago Dr. Wiglesworth was very seriously assaulted by a patient while on his rounds at Rainhill Asylum, and but for the fact that he was accompanied by one of his medical colleagues he would there and then have bled to death from a murderous wound in his throat. His early retirement from lunacy practice was probably the outcome of shock after that assault. His withdrawal from practice was much deplored by his colleagues in the specialty, who looked upon him as a keen investigator and indefatigable worker in the difficult domain of cerebral pathology.

On his retirement Dr. Wiglesworth went to live at Winscombe, in Somerset. At the time of his death he was engaged on a work descriptive of the birds peculiar to the county of Somerset, and his investigations took him to Hurlstone Point, on the eastern side of Porlock Bay. The circumstances of his death are obscure, but it appears that he may have fallen from the cliff on May 16th. His absence from the hotel caused alarm, and search parties scoured the coast. The body was found on the shore two days later at low tide. The coroner found that death was caused by fracture of the skull and not by drowning.

Dr. Wiglesworth leaves a widow; his only son was killed during the war whilst in the Air Service.

IN the obituary notice of Captain J. C. M. BAILEY, O.B.E., R.A.M.C., published in the BRITISH MEDICAL JOURNAL of May 3rd, his services during the present war were not given. He was the eldest of six sons, all of whom joined the forces for the war. He served in the Kamerun campaign of 1914–15, when he was mentioned in dispatches, and was afterwards transferred to Salonica, where he served for two and a half years, and was again mentioned in dispatches, receiving the O.B.E. (Military Division) on January 1st, 1919.

Universities and Colleges.

UNIVERSITY OF CAMBRIDGE.

Diploma of Psychological Medicine.

COURSES in preparation for Parts I and II of the examination for the diploma in psychological medicine will be held at the Psychological Laboratory, Cambridge, from August 2nd till August 30th. The classes will be conducted as follows:—Part I: Psychology, with practical work, Dr. J. P. Lowson; Anatomy and Physiology of the Nervous System, with practical work, Dr. E. D. Adrian. Part II: Neurology, Dr. Adrian; Psychiatry, Lunacy Law and Administration, Dr. M. H. Archdale, Superintendent of the Cambridge County Asylum; Psychopathology, Dr. W. H. R. Rivers, F.R.S. The inclusive fee for Part I is £4 4s. and for Part II £4 4s. For further particulars application should be made to Dr. C. S. Myers, F.R.S., The Psychological Laboratory, University of Cambridge.

UNIVERSITY OF LONDON.

LONDON (ROYAL FREE HOSPITAL) SCHOOL OF MEDICINE FOR WOMEN.

THE following scholarships will be awarded this summer:

(1) St. Dunstan's Medical Exhibition: £60 a year for three or five years. (2) Mrs. George M. Smith Scholarship: £50 a year for three or five years. (3) Isabel Thorne Scholarship: £30 for one year. (4) Mabel Sharman Crawford Scholarship: £20 a year for four years. (5) Dr. Margaret Todd Scholarship: £37 10s. a year for four years. (6) Sarah Holborn Scholarship: £20 a year for three or five years. (7) Agnes Guthrie Bursary for Dental Students: £50 for one year.

Nos. 1, 2, 5, 6, and 7 will be awarded to candidates who are in need of financial assistance for the prosecution of their medical studies. Applications for Nos. 5, 6, and 7 must be received by July 1st. Forms of application and full particulars can be obtained from the Warden and Secretary, Dr. Louie M. Brooks, Hunter Street, Brunswick Square, W.C.1.

ROYAL COLLEGE OF SURGEONS OF EDINBURGH.

THE following gentlemen having passed the requisite examinations have been admitted ordinary Fellows:

D. H. Bett, M.B.Univ. New Zealand, C. Bouck, M.B.Toronto, O. T. Dinnick, M.B.Toronto, Haji Hyderali Khan, L.M.S.Bombay, A. V. Meehan, M.B.Sydney, J. T. Wall, M.D.McGill.

The Bathgate Memorial prize, consisting of bronze medal and set of books, was, after a competitive examination in materia medica, awarded to Mr. W. F. G. Radford.

The Services.

ROYAL NAVY.

RETIREMENT OF SIR W. H. NORMAN, K.C.B.

SURGEON VICE-ADMIRAL SIR WILLIAM HENRY NORMAN, K.C.B., who, as already announced, has retired at his own request from the office of Director-General of the Medical Department of the Royal Navy, comes of a naval family. His grandfather and three of this officer's brothers served in the navy during the Napoleonic wars. One—afterwards killed as lieutenant of the *Sirius* when leading an attack on the Ile de la Passe—was present at Trafalgar. Another was killed in action in 1814. Sir William Norman's father, who held the Baltic and China medals, and four of this officer's brothers also served in the Royal Navy, and Sir William's two sons are now serving in the navy. Sir William Norman himself entered the navy in August, 1882, and as surgeon of the *Reindeer* was mentioned in dispatches for his treatment of the wounded after an action with a slave dhow at Zanzibar in 1887. In 1895 he was a member of the party landed at Mombassa for the punishment of a rebellious Arab chief, and received the African General Service medal. He was a member of the committee on naval medical service in 1907, and naval member of the Medical Consultative Board. He was surgeon-general R.N. Hospital, Plymouth, when appointed medical director-general of the navy in 1917. He received the C.B. in 1916 and the K.C.B. in 1918. He is a Commander of the Legion of Honour, of the Crown of Belgium, and of the Star of Rumania, and Grand Cordon of the Sacred Treasure (Japan). During his two years of office as medical director-general he has shown himself an able and sympathetic administrator, devoted to the interests of his service, easily accessible to its officers, and desirous, so far as the times permitted, to advance the cause of medicine afloat. His successor, Sir Robert Hill, K.C.M.G., C.B., will have no light task in attempting to complete the work which has been begun.

HONOURS.

MESOPOTAMIA.

THE following awards are announced in recognition of gallantry and devotion to duty in the field in Mesopotamia:

D.S.O.

Captain Heerajee Jehangir Manockjee Cursetjee, I.M.S., attached 14th Sikhs.

For conspicuous gallantry and devotion to duty at Mushaq, October 26th-27th, 1918, and at Sharqat, October 29th. Throughout the operations he displayed the greatest zeal and disregard for danger while tending the wounded under heavy fire, working unceasingly for forty-eight hours. He has previously rendered excellent service, and once was severely wounded.

Military Cross.

Captain John George Bennett, R.A.M.C., attached 20th Brigade R.F.A.

For conspicuous gallantry and devotion to duty at Mushaq, October 26th, 1918. He worked day and night in the open under heavy fire, tending the wounded and superintending their evacuation. His energy and disregard of danger throughout were admirable.

Captain Maurice Dwyer, R.A.M.C.(S.R.).

For conspicuous gallantry and devotion to duty on October 29th-30th, 1918, at Sharqat. He displayed great disregard of danger during an attack on the enemy's position. He remained all day and night exposed to heavy fire searching for and dressing the wounded. In the dark he made his way forward to the firing line to see if his services were required, and stayed there attending to and superintending the evacuation of the wounded.

Captain Harold Jacques, R.A.M.C.

For conspicuous gallantry and devotion to duty at the Lesser Zab on October 25th 1918. When the artillery brigade to which he was attached was in action he displayed great disregard of danger in attending the wounded under heavy fire. Four battery wagons were exploded by shell fire but he continued to work in close proximity, rendering most valuable assistance until all cases were successfully evacuated.

2nd Class Senior Subassistant Surgeon Bhagwan-Singh, I.O.M., Indian Medical Department.

For conspicuous gallantry and devotion to duty at Sharqat on October 29th, 1918. When the regimental aid post came under heavy fire he displayed the utmost coolness in appeasing the wounded and alleviating their sufferings. Throughout the action his conduct was a fine example to his subordinates.

NORTH RUSSIA.

The following are among the recipients of immediate awards for conspicuous gallantry and devotion to duty in North Russia conferred by Major-General W. E. Ironside, C.M.G., D.S.O., in pursuance of powers vested in him by H.M. the King:

Bar to Military Cross.

Temporary Captain John Dalgliah Watson, M.C., R.A.M.C.

For conspicuous gallantry and devotion to duty in evacuation of wounded from Toulgas during the period November 12th-14th, 1918, under fire and through drift ice with a panic-stricken crew on the river steamer. (M.C. gazetted January 1st, 1918.)

Military Cross.

Captain (acting Major) Frank Mortimer Taylor, R.A.M.C.(S.R).

For conspicuous gallantry and devotion to duty on December 30th, 1918, at Kodish, when he urged his sleigh drivers into Kodish through severe fire. He thus established a dressing station, collecting and tending the wounded under difficult and dangerous conditions.

Lieutenant John Peter, R.A.M.C.(S.R.), attached 17th Battalion Liverpool Regiment.

For gallantry and devotion to duty during the attack on enemy positions near Kodish on February 7th, 1919. Under heavy fire he attended to the wounded and placed them on sleighs. It was largely due to his fine conduct that the wounded were promptly evacuated and many lives saved.

ORDER OF THE BRITISH EMPIRE.

The following appointments to the Order of the British Empire are announced in recognition of valuable services rendered in connexion with the war:

Officers of the Military Division (O.B.E.).

Surgeon Commander William Rhodes Harrison, R.N.
For valuable services as senior medical officer of the Sixth Destroyer Flotilla.

Surgeon Lieutenant Stanley Samuel Beare, R.N.
For valuable services in attending to the sick and wounded in the Dover Patrol.

Member of the Military Division (M.B.E.).

Surgeon Sublieutenant Donald Eadie Brown, R.N.V.R.
For valuable services in attending to sick and wounded of the Dover Patrol.

The Meritorious Service Medal has been conferred upon Surgeon Lieutenant Samuel Franklin Abbott, R.N., for services in ocean escorts between July 1st and November 11th, 1918.

FOREIGN DECORATIONS.

The President of the French Republic has conferred the silver Médaille d'Honneur des Epidémies upon Surgeon Commander Charles R. Sheward, R.N., and Surgeon Lieutenants Abel Evans and Richard Wilkins, R.N., for distinguished services rendered during the war.

The King of Hellenes has appointed Surgeon Lieutenant Commander Douglas A. Mitchell, R.N., to be an Officer of the Order of George I in recognition of distinguished services rendered during the war.

The President of the French Republic has appointed Surgeon Captain George T. Broatch, C.B.E., R.N., to be an Officer of the Legion of Honour; and Surgeon Lieutenant Michael E. T. D. Vlasto, R.N., an Officier d'Instruction Publique, for distinguished services rendered during the war.

Medical News.

MAJOR-GENERAL SIR ANTHONY BOWLBY, K.C.M.G., K.C.V.O., C.B., having relinquished the appointment of consulting surgeon to the British armies in France, has returned to London.

SIR W. ARBUTHNOT LANE, Bt., C.B., is leaving for New York this week to attend the conference of the American Medical Association (Victory meeting) as the representative of the Royal Society of Medicine.

THE library and offices of the Royal Society of Medicine will be closed for the Whitsuntide holidays from Saturday, June 7th, to Monday, June 9th, both days inclusive.

AT the forthcoming eighty-seventh meeting of the British Association, which will be held at Bournemouth on September 9th–13th under the presidency of Sir Charles Parsons, Professor Arthur Keith, M.D., F.R.S., will preside over the section of anthropology, and Professor Noël Paton, M.D., F.R.S., over the section of physiology.

THE Cavendish Lecture before the West London Medico-Chirurgical Society will be given at the West London Hospital on Friday, June 20th, by Sir George Makins, G.C.M.G., C.B., P.R.C.S., the subject selected being the part of the consulting surgeon in war. The annual dinner of the society will be held at Pagani's Restaurant, Great Portland Street, W., on July 10th.

THE Royal Institute of Public Health will hold a conference in London at the end of June at the Guildhall.

SIR JOHN COLLIE, C.M.G., has been appointed deputy coroner for the Hatfield district of Hertford.

AT a penal meeting of the Central Midwives Board for England and Wales on May 22nd, with Sir Francis Champneys, Bt., in the chair, three women were struck off the roll, two of them principally on charges of neglect of ophthalmia neonatorum; both were very advanced in years. After the conclusion of the penal board the ordinary monthly meeting was held. The report of the standing committee included a letter from the British Medical Association with reference to the fees to be tendered by the Board to medical practitioners asked to give oral evidence in penal cases. Eighteen midwives were accepted by the Board by reason of their having obtained the certificates of the Central Midwives Boards for Ireland and Scotland respectively.

ON April 27th Dr. J. A. Turner, C.I.E., sailed for England on his retirement after nineteen years' service as municipal executive health officer for the City of Bombay. The *Times of India* for April 26th gave an appreciative review of some of the chief features of Dr. Turner's work in Bombay—more especially in the organization of measures against plague, malaria, and cholera, and the systematic registration of births and deaths in the city—and paid a tribute to Dr. Turner for his extra-official and honorary work on behalf of the Bombay Sanitary Association and the Bombay Sanitary Institute. The foundation of the King George V Anti-Tuberculosis League was also due to his initiative. An entertainment was given in honour of Dr. Turner and Dr. N. H. Choksy, the assistant health officer, on the eve of their retirement, when the chairman, Sir T. B. Nariman, presented them with silver bowls as mementos of their work in Bombay.

THE annual meeting of the Asylum Workers' Association, held at the house of the Medical Society of London on May 21st, was overshadowed by a consciousness of the severe loss the association had sustained by the recent death of its president, Sir John Jardine, Bt. Lieut.-Colonel D. G. Thomson, M.D., R.A.M.C., who occupied the chair, referred in sympathetic terms to the invaluable services of Sir John Jardine during his seven years' presidency, and Sir William Collins, M.D., testified to his benevolent efforts in the cause of asylum workers, both in assisting to pass the Asylums Officers' Superannuation Act, 1909, and in placing before Parliament amendments subsequently found desirable. The report for 1918 having been adopted (showing a membership of 2,171) the re-election of the Vice-Presidents and Executive Committee was carried, on the proposal of Sir F. Needham, M.D. (Commissioner of the Board of Control), and other necessary business transacted.

Letters, Notes, and Answers.

AUTHORS desiring reprints of their articles published in the BRITISH MEDICAL JOURNAL are requested to communicate with the Office, 429, Strand, W.C.2, on receipt of proof.

IN order to avoid delay, it is particularly requested that ALL letters on the editorial business of the JOURNAL be addressed to the Editor at the Office of the JOURNAL.

The postal address of the BRITISH MEDICAL ASSOCIATION and BRITISH MEDICAL JOURNAL is 429, Strand, London, W.C.2. The telegraphic addresses are:

1. EDITOR of the BRITISH MEDICAL JOURNAL, *Aitiology, Westrand, London*; telephone, 2631, Gerrard.
2. ACTING FINANCIAL SECRETARY AND BUSINESS MANAGER (Advertisements, etc.), *Articulate, Westrand, London*; telephone, 2630, Gerrard.
3. MEDICAL SECRETARY, *Medisecra, Westrand, London*; telephone, 2634, Gerrard. The address of the Irish Office of the British Medical Association is 16, South Frederick Street, Dublin.

QUERIES AND ANSWERS.

THE ROAD SIGNAL.

A MIDDLE-AGED doctor who drives his own car (a closed coupé) asks whether there is any contrivance for signalling to traffic that he is going to turn; being rheumatic he is afraid to keep the right window open to signal with the raised arm in the usual way.

ARRANGEMENTS FOR DISPENSING BY CHEMIST.

"M.D." writes: IN a mixed country and small town practice we wish to hand over our dispensing to a chemist, and desire information as to the best methods to adopt in order to avoid complex bookkeeping and to ensure easy reference to previous prescriptions, fair dealing and prices, with proper checking of accounts. Information as to prices already in force would be very acceptable.

LETTERS, NOTES, ETC.

FAILURE TO NOTIFY OPHTHALMIA NEONATORUM.

DR. J. A. NEILAN (New Seaham, co. Durham) writes: I notice in the BRITISH MEDICAL JOURNAL of May 24th a report of a case in which a doctor at Newcastle-on-Tyne was fined £50 for failing to notify a case of ophthalmia neonatorum. I enclose notification form for this disease, supplied to me by the M.O.H. of this area, on which it is stated, in footnote, that the penalty for failure to notify this disease does not exceed forty shillings. If the law allows the imposition of a larger penalty, it would be interesting to know why this misleading statement is printed on these forms.

*** As stated in the note last week the charge was of unlawfully and wilfully neglecting to obey a regulation of the Local Government Board. The charge was made in

pursuance of Section 130 of the Public Health Act, 1875, and the Public Health (Ophthalmia Neonatorum) Regulations, 1914. The regulations were made under the Public Health Act, 1875, amended by the Public Health Act, 1896. The Public Health Act, 1875, provided that "any person wilfully neglecting or refusing to obey or carry out, or obstructing the execution of any regulation made" by the Local Government Board "shall be liable to a penalty not exceeding £50." The Act of 1896 rendered such person "liable to a penalty not exceeding £100, and in the case of a continuing offence to a further penalty not exceeding £50 for every day during which the offence continues." The Infectious Disease Notification Act, 1899, provides that a medical practitioner on becoming aware that a patient he is attending, or is called in to visit, is suffering from an infectious disease to which the Act applies, shall forthwith send a notification certificate to the medical officer of health. The penalty for failing to give such a certificate is a fine not exceeding 40s. Whether the charge at Newcastle could have been framed under the Infectious Disease Notification Act or not we are not prepared to say, though from the terms of the Order it would appear that it could not have been so framed. Nor are we prepared to say whether the footnote to the certificate enclosed by our correspondent is in order or not.

The Neurological Hospitals of the Ministry of Pensions.

As part of the scheme of reorganization of the Ministry of Pensions it is intended to open neurological hospitals in various parts of the country for the care and treatment of pensioners suffering from war neuroses. About ten of these institutions are in contemplation, each with a medical staff of one senior and two or more junior medical officers. Applicants are required for these posts. The head quarters of the Medical Department of the Ministry are at Cromwell House, Westminster, S.W.1.

The Scientific Meeting.

DR. JOHN HADDON (Denholm, Hawick, Scotland) has sent a letter in which he makes the following observations: Having read the report of the proceedings at the Scientific Meeting of the Association, I cannot help writing to express the pleasure I felt and the memories it recalled of such meetings in my youth, before the democratization of the Association and its embarkation on trade union lines. I cannot help thinking that, unless the British Medical Association confines itself to the scientific interests of the profession, "Ichabod" may be put above its portals. There were few of my contemporaries at that meeting, nearly all of them having "crossed the bar," but I feel sure that the few that are left will, along with me, regret the change of policy which the reorganization of the Association heralded, and long for the days when we met without any thought of remuneration for our services in connexion with the Association or of fees for practice. Science ought to be our aim. Professor Syme, in his opening lecture on clinical surgery, every year told us to make the good of our patients our first consideration, and never think of the fees. If Government is determined to exploit the medical profession, let it do so with those who are willing to be enslaved; but, from my experience in practice among patients in clubs, who could have had advice and medicine through their clubs without coming to me, I feel sure that a good man will be able to make a good income apart from the panel. Nevertheless, I am quite aware that, in the present state of the licensing corporations, there are many who, apart from the panel, would never make a living, with whom the profession is a mere trade. If the new medical union can combine such members of the profession into a trade union, so as to fight the Government, let it do so, but it is to be hoped that the British Medical Association will return to the methods under which it attained unrivalled success. It would be far better for us as a profession to be poor and self-respecting than to be rich and be reduced to the level of a trade. Let the JOURNAL and the scientific meetings, with the social attractions of the annual meeting, be, as they used to be, the bonds of union among the members, and many will return.

Civil Surgeons on Transport Liners.

"SHAFARING SURGEON" writes: Your correspondents "Malta, 1915," and "Aggrieved" (May 17th, p. 630), do not state whether they are service men or not, but it is to be presumed this is so. In any case they are quite justified in their claims for recognition. I should like to point out that a fairly numerous body of medical men do not appear to have any prospect whatever of notice being taken of their services. I refer to civil surgeons on transport liners. Their work has been silent, arduous, and unrecognized. In emergencies their ships have been filled with wounded, whom they tended in some instances singlehanded. Personally this has been my own experience. In addition I have been sniped at, shelled, had bombs dropped round from aeroplanes, and been chased by submarines. I hope the British Medical Association will have room on its broad back to shoulder the aspirations for the 1914-15 ribbon and other decorations for patriotic seafaring surgeons.

Injection of Whole Blood in Influenza.

THE note by Dr. Huff-Hewitt in the JOURNAL of May 10th, p. 575, on four cases of influenza treated by him with human serum has induced Dr. P. M. Carlyle, H.M. Factory, Gretna, to send a note on a severe case of influenza in a youth who, in spite of various remedies, including a serum, grew worse and appeared to be about to die. Blood was obtained from a male patient, convalescent from influenza but otherwise in good health. The amount withdrawn from the donor's arm was 15 c.cm., and this was immediately injected hypodermically into the arm of the semi-comatose patient. That night his condition remained unchanged, but next day he seemed slightly better, though there was no marked change until the third day; then the temperature rose quickly to nearly 106° F., but fell steadily until it reached 99.5° F. in the evening. Eventually the youth made a good recovery. Whole blood was used because there was no time to prepare serum. The blood produced no untoward symptoms or rash and was all absorbed in twelve hours.

Adsorption.

A CORRESPONDENT who was a student a quarter of a century ago finds some of the terms now commonly used in physiology and pathology perplexing, and asks in particular for a definition of "adsorption." It is unfortunately impossible to give an intelligible definition in a few words. The subject is fully discussed by Professor Bayliss in his *Principles of General Physiology*. We shall not, we hope, misrepresent him in what follows. The surface of contact between a liquid and another phase—solid or immiscible liquid, or gas—has properties differing from those of the main body of either phase. The surface film behaves as if stretched, so that it is the seat of a special kind of energy. This "surface tension" has its origin in the forces of attraction between the molecules of the liquid, and its amount varies with the chemical nature of the liquid. At the interface there is a local accumulation of free surface energy, which is altered in amount by the deposition of substances at the interface. It follows, by one of the laws of energetics, that dissolved substances which lower surface tension will be concentrated in this situation. Any substance, in solution in a liquid, in contact with the surface of another phase, will be concentrated on that surface if by this the free energy present there is decreased. This process is called "adsorption." Its characteristic is the relation to surfaces of contact. Whatever further process may follow, whether chemical reaction or diffusion into the body of the other phase, the first thing to take place is this local concentration. "Adsorption" plays an important part in physiological phenomena. Although not instantaneous it takes place very rapidly when the components are approximated. Finally, Professor Bayliss says that adsorption cannot be completely or satisfactorily explained by chemical combinations nor by partition between phases. It is still under investigation in many directions.

Meningismus.

DR. A. G. C. POCOCK (Shotley Bridge) writes: Male infant, aged 14 months, became ill with high temperature and bronchial symptoms on March 3rd; on March 6th a patch of pneumonia was diagnosed. From March 9th to March 13th the temperature kept at 105°. There was photophobia, nystagmus, and *tache cérébrale*, but Babinski's sign was negative. The abdomen was distended with constipation. On March 13th the temperature fell to 103°, and there was improvement; but the temperature was again 105° on March 14th, when the child was comatose and the pupils inactive. On ophthalmoscopic examination (difficult on account of the oscillatory movement of the eyes) nothing abnormal was detected. On March 16th the temperature fell to 100°, and on March 18th was normal and the child convalescent. Lumbar puncture was projected, but not done as the child had improved. The treatment mainly was phenacetin and calomel, āā gr. j, every six hours.

THE appointment of certifying factory surgeon at Maryborough (Queen's County) is vacant.

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